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Tables of Atomic Wave Functions

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**Tables of Atomic Wave Functions**

by

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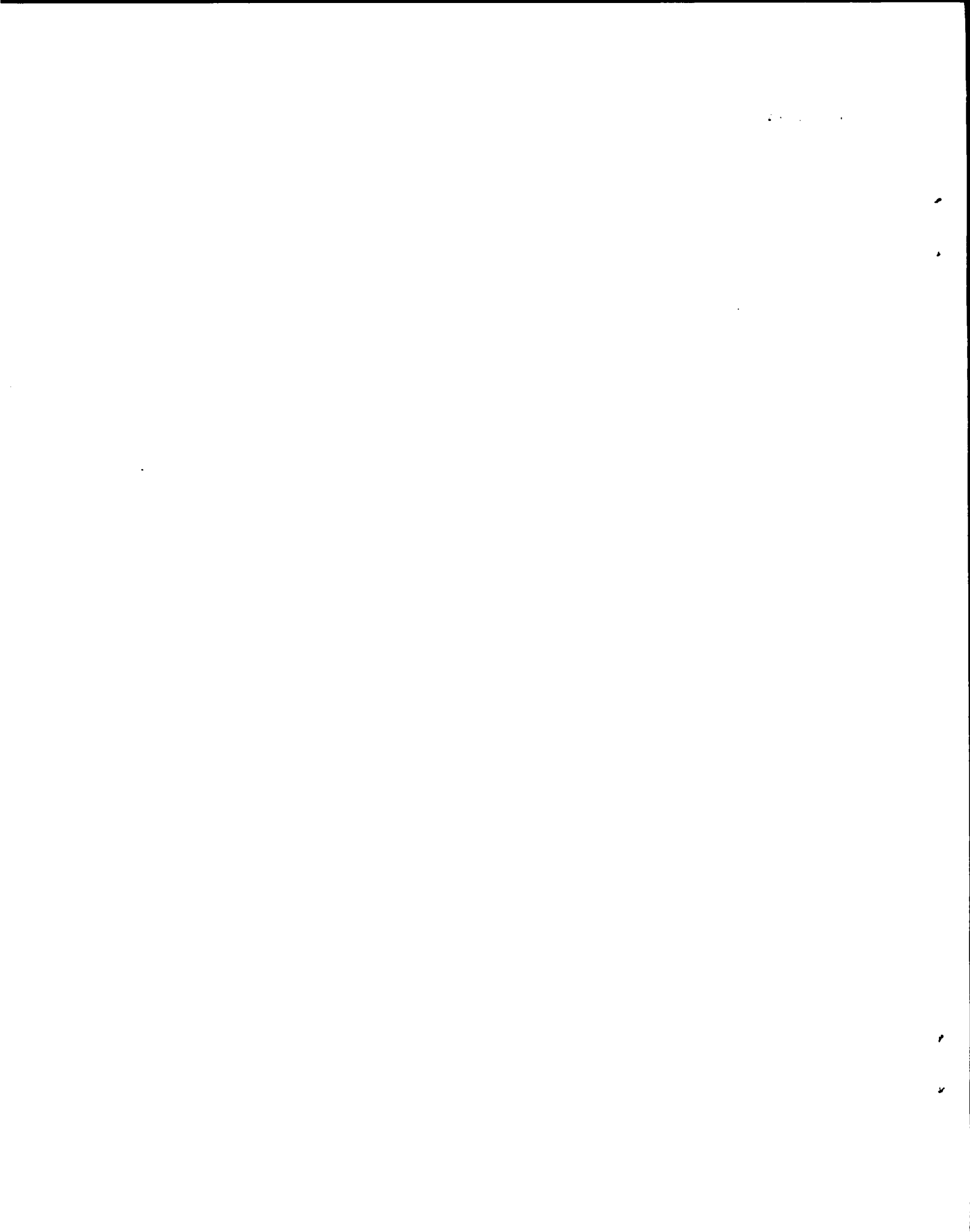
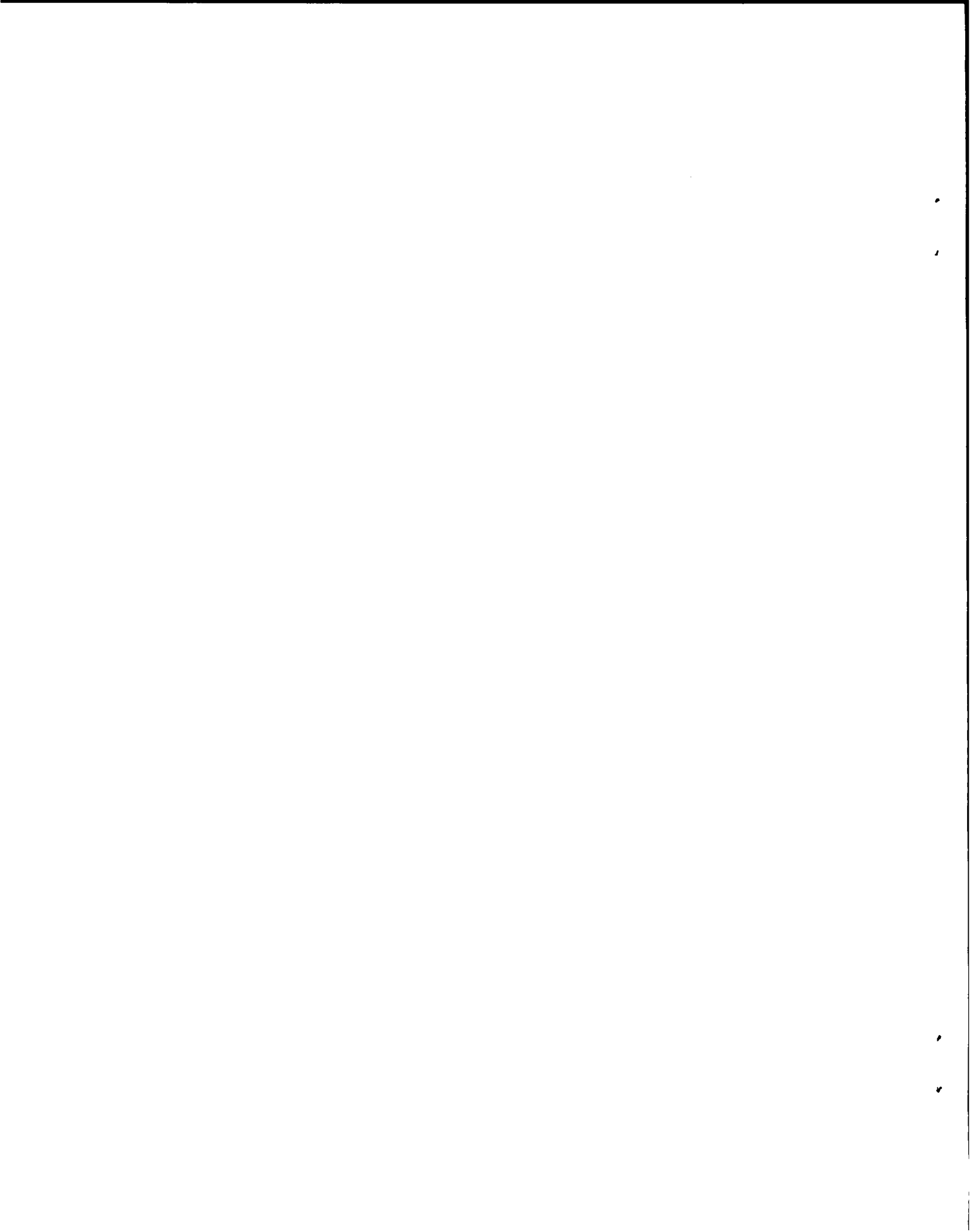


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TABLES OF ATOMIC WAVE FUNCTIONS

by

V. F. Brattsev

ABSTRACT

Atomic wave functions have been calculated and tabulated for the elements helium through argon, singly and doubly ionized, by the Hartree-Fock-Slater self-consistent-field approximation. The development and applications of that approximation are described.

INTRODUCTION

Quantum mechanics serves as the basis for fundamental modern theories of physical and chemical properties of atoms, molecules, and condensed systems. The task of theoretical calculations of these properties comes, in the final analysis, to the solution of Schrödinger's equation. For the majority of specific problems of atomic physics, knowledge of the ground-state energy of a system and the corresponding wave functions of stationary states is necessary. These data have already made it relatively easy to calculate the entire combination of the optical, electrical, magnetic, and chemical characteristics of these systems.

Unfortunately, the mathematical difficulties of the solution of Schrödinger's equation are such that its exact solution in a final form is practically unattainable. Therefore, in specific calculations we are forced to limit ourselves to approximate solutions with a greater or lesser degree of accuracy. By these means, one can determine the greater value of different types of approximation methods for quantum mechanics.

In approximation methods, specific physical concepts ordinarily are used to permit one to introduce greater or lesser simplification into the general equations of the theory. Because of this, the use of the approximations in comparison with the general theory is limited to the smaller sphere of objectives or phenomena in which the corresponding

simplification is permissible.

Obviously, the simplest class of structured objects of the microcosm accessible to theoretical calculation is that formed by free atoms (we do not take into account atomic nuclei and elementary particles, the theory of which enters into the framework of quantum mechanics). Therefore, in the first year of development, the application and, later, the verification of quantum mechanics were tested on the simplest atoms.

The atomic-wave-function calculations represent the central problem of the theory of atoms and its numerous applications. Atoms, to a considerable degree, retain their individuality in the complex formations of molecules and crystals. Therefore, atomic wave functions are also used in the theory of these complex objects. Hence we understand the scientific interest and also the significance of methods for deriving atomic wave functions.

The stationary equation for atomic hydrogen and its solution were given in 1926 in the initial pages of Schrödinger's first report<sup>1</sup> concerning quantum mechanics. In the same year, Heisenberg<sup>2</sup> formulated the approximate theory for the helium atom, showing how to treat the cases of ortho- and para-electron states. Later, there appeared a series of articles devoted to the calculation of helium-like atoms, ending with the computation of Hylleraas,<sup>3</sup> which was record breaking for that time. There was interest in similar calculations, particularly the questions

in connection with the broad program of experimental research begun by Herzberger, for the determination of the magnitude of radiation displacement of the basic energy levels of the two-electron atom and ions. If it is taken into account that radiation corrections are very small (for example, for the  $1^1$ s state of helium it is  $2 \times 10^{-6}$  of the energy of that state), it becomes clear that the appropriate calculation becomes exceedingly complicated and laborious.<sup>4,5</sup>

In 1927, Pauling<sup>6</sup> made a theoretical estimation of the radii and polarizabilities of many-electron atoms and ions, attributing to each electron a hydrogen-like wave function with a properly selected screening constant. There then followed the calculation of analytical hydrogen-like functions with varying exponential indices.<sup>7,8</sup> On the basis of such calculations, Slater<sup>9</sup> constructed empirical rules for the selection of parameters for nodeless, radial, one-electron functions of any atom and molecule. These Slater functions were extensively used in basic calculations for atoms and molecules. Interest in analytical hydrogen-like functions has continued.<sup>10,11</sup>

The general quantum mechanics method of calculation of one-electron atomic functions and atomic fields was introduced in 1927 by Hartree.<sup>12</sup> Hartree's method is based on the fact that every electron in an atom is represented by its own wave function  $\psi_n(q)$ , and the contribution  $V_n(q)$  to the effective electrostatic field of the atom is defined by the integral:

$$V_n(q) = e \int \frac{|\psi_n(q')|^2}{|q - q'|} dq'.$$

Then the Schrödinger equation for the wave function of the atom is replaced by a system of nonlinear integro-differential equations for one-electron functions, in each of which the operator of the interaction of a given electron, along with all the rest, is given by sums of the integrals of the indicated type. The one-electron wave functions obtained as the result of a solution of a system of equations determines the character of the field in which the electrons are located, i.e., the coefficient of the equations. This characteristic of Hartree's equation is reflected in the name "equations of a

self-consistent field." From the hypothesis of a spherical symmetry of the atomic field after integration over angular variables, the Hartree equations represent a system of ordinary integro-differential equations for radial functions.

In connection with the determination of one-electron wave functions, there is also the problem of constructing general wave functions of a system made up of one-electron functions. In general, this question is connected with the Pauli principle and with the symmetry properties of wave-function coordinates. In 1930, Fock<sup>13</sup> demonstrated that Hartree's equations could be obtained by modifying the variational derivative of the Schrödinger equation for the many-electron system, if one represents the wave functions of that system in terms of the product of one-electron functions and varies the latter. The product of one-electron functions, generally speaking, does not satisfy requirements of Pauli's proper symmetry principle. Utilizing in the variation principle the wave-function system constructed from the one-electron functions and taking into account Pauli's principle, Fock obtained a system of equations different from Hartree's equations by the presence of supplementary so-called exchange members in the operator of the Coulomb interaction of electrons. These exchange members also determine the separation into terms distinguished by the values of the total spin  $S$  and angular momentum  $L$  of the electrons.

The equations of the self-consistent field with the Fock exchange give the best description of many-electron systems within the framework of a one-electron approximation as they are derived by variational means with this single simplifying assumption. Therefore, beginning in 1930, a significant number of atomic calculations were carried out by Hartree,<sup>14,15</sup> his students, and others, using Fock's integral equations. The construction of high-speed calculating machines exerted an influence on the general direction of the calculation of atomic structures. After 15 years, almost all endeavors in this field are devoted to the calculation of analytical wave-function parameters. As Löwdin<sup>16</sup> demonstrated, radial wave functions can be accurately approximated by a linear combination of Slater's functions without node with properly selected indices of exponents and coefficients. Therefore, this form of analytic wave func-



tions was selected by most authors.<sup>17-23</sup> Such a change in the general direction is apparently connected with the fact that until recently, computers possessed a highly restricted memory. The analytic form of the functions permits one to use relatively few data, which is its advantage. As with numerical integration, one has to deal with rather cumbersome tables. However, with increased numbers of shells in the atom, the number of parameters quickly increases and the amount of work necessary for obtaining them also increases, quickly exhausting the capacity of the most powerful computers.

In connection with what has been said in the literature, we again observe the tendency toward the numerical integration of the Hartree and Hartree-Fock equations.<sup>24</sup> This is contributed to by the growth in capacity of the memory storage of contemporary computers and also to the development of more perfect methods of numerical integration of differential equations, for example, the method of "dispersion" by elimination of fluctuation.<sup>25</sup> Some of the first work devoted to numerical integration of the equation of the self-consistent field done on electronic computers is related in articles cited as Refs. 26-30. Work for the following years is noted in Refs. 31 and 32 and the article cited as Ref. 24.

The Hartree-Fock equations for the structure of heavy atoms contain very unwieldy exchange terms. Their solution demands considerable computer working time, where about 80% of the time is expended on the calculation of exchange interaction. This calculation in heavy atoms plays a comparatively minor role compared with the uncalculated relativistic, spin-orbit-interaction terms. In this case, the value of an energy level is determined to a greater degree by the relativistic terms in the energy operator rather than by the Coulomb exchange interaction. Therefore, in the framework of a nonrelativistic approximation, it would be possible to limit oneself to the solution of the self-consistent field equations without exchange or try to take into account the exchange by a simplified method.

Such an approximate variant of the exchange factors was proposed by Slater.<sup>33</sup> Making use of Slater's simple approximations, Herman and Skillman<sup>34</sup> produced voluminous wave-function calculations of the basic states of all the elements from  $Z=2$  to

$Z=103$ . The results of these calculations are published in a separate volume, which, apparently, is the sole extensive publication of atomic wave functions.

However, with the progression to heavy atoms on the basis of the calculations, we must now adopt the one-electron equation of the Dirac type with the self-consistent potential. As we know, only the first steps have been ventured in this direction.

As far as medium and light atoms are concerned, the solution of Hartree-Fock's equation is fully justified. But, at the present time, there do not exist voluminous publications on the wave functions of these atomic calculations in the Hartree-Fock approximation. These tables, to a certain degree, fill that gap.

The tables contain the normalized radial wave functions,  $P(n\ell|r)$ , of stationary states of atoms and ions and are related to the three-dimensional one-electron wave functions,  $\psi(n\ell m|r)$ , by the equation

$$\psi(n\ell m|r) = \frac{1}{r} P(n\ell|r) Y(\ell m|\vartheta, \varphi).$$

The functions  $P(n\ell|r)$  are obtained by a numerical solution of the Hartree-Fock equations.

This article contains the results of calculations for all terms of the principal elemental configurations of singly- and doubly-ionized atoms from helium to argon, inclusive.

The form of the tables is traditional. The functions  $P(n\ell|r)$  are cited separately for each state of the atom or ion. For the sake of simplicity in the use of the tables, we did not include the columns containing the functions coinciding in limits of accuracy but pertaining to a different state. At the end of each column are given the values of the Lagrange diagonal multipliers  $\lambda(n\ell)$  and the mean values of the powers of the variable  $r$ ,

$$\langle r^\alpha \rangle = \int_0^\infty r^\alpha P^2(n\ell|r) dr,$$

for  $\alpha = -2, -1, 1, \text{ and } 2$ . All numbers are cited with an accuracy up to the last significant figure.

The method of Hartree-Fock is set forth at length in Ref. 15. We stopped at its last stage; that is, at the numerical determination of the equations of the self-consistent field.

For the atom with the nuclear charge  $Z$  in a state belonging to the configuration  $(n_1 l_1)^{q_1} \dots (n_s l_s)^{q_s}$  and to any single term, the equations have the form:

$$\left\{ \frac{d^2}{dr^2} + \frac{2(Z - Y)_\sigma}{r} - \frac{l_\sigma(l_\sigma + 1)}{r^2} - \lambda_{\sigma\sigma} \right\} P_\sigma = - \frac{1}{r} \sum_{\sigma' \neq \sigma} \left( \sum_k \gamma_{\sigma\sigma'k} Y_{\sigma\sigma'k} - \lambda_{\sigma\sigma'} \right) P_{\sigma'}, \quad (1)$$

$$0 \leq r < \infty, \quad 1 \leq \sigma \leq s,$$

where

$$Y_\sigma = \sum_{\sigma'} (q_{\sigma'} - \delta_{\sigma\sigma'}) Y_{\sigma'\sigma'0} - \sum_{k>0} \gamma_{\sigma\sigma k} Y_{\sigma\sigma k},$$

$$Y_{\sigma\sigma'k} = \int_0^r \left(\frac{r'}{r}\right)^k P_{\sigma\sigma'} dr' + \int_r^\infty \left(\frac{r}{r'}\right)^{k+1} P_{\sigma\sigma'} dr'.$$

The coefficients  $\gamma_{\sigma\sigma'k}$  are determined by the configuration and the term. The function  $P(n_\sigma l_\sigma | r)$  are briefly designated by  $P_\sigma$ .

Equation (1) represents the condition that the expected value of the total energy be stationary with respect to variations of the functions  $P_\sigma$  and be subject to the supplementary conditions:

$$P_\sigma(0) = P_\sigma(\infty) = 0, \quad (2)$$

$$\int_0^\infty P_\sigma^2 dr = 1, \quad (3)$$

$$\int_0^\infty P_\sigma P_{\sigma'} dr = 0, \text{ then } l_\sigma = l_{\sigma'}, n_\sigma \neq n_{\sigma'}. \quad (4)$$

The parameters,  $\lambda_{\sigma\sigma'}$ , appear in the calculation of these conditions as Lagrange multipliers, whereupon the diagonal multipliers,  $\lambda_{\sigma\sigma}$ , correspond to normalization conditions in Eq. (3), and the nondiagonal multipliers,  $\lambda_{\sigma\sigma'}$ ,  $\sigma \neq \sigma'$ , correspond to orthogonal conditions in Eq. (4). To simplify the task, we delete the last term from the calculation and assume  $\lambda_{\sigma\sigma'} = 0$  with  $\sigma \neq \sigma'$ . As we know, it is possible, in a number of cases, to do this without any disadvantage, as when, for example, all the shells are closed in a configuration. In general, there is a basis for hoping that nondiagonal multipliers can be made so small that they can be disregarded without exerting a significant effect on the solution of the system in Eq. (1). Calculations have shown that

this hope is very often (but unfortunately, not always) justified, and orthogonality conditions are fulfilled to a sufficient degree of accuracy in a natural way. Further, with reference to the system in Eq. (1) we shall always assume the absence of the nondiagonal Lagrangian multipliers.

Thus, the problem consists of searching for a solution to the system in Eq. (1), satisfying conditions in Eqs. (2) and (3), and of belonging to a given configuration. The latter means the following: neither the equations nor the supplementary conditions depend upon the principal quantum number,  $n_\sigma$ , entering into the configuration. It is natural that the system in Eq. (1) may have many solutions satisfying the conditions in Eqs. (2) and (3). There is the further necessity of one additional condition permitting each solution to lead to a specific configuration. To formulate it, we note that each equation of the system in Eq. (1), by obvious substitution of functions  $P_\sigma$  into  $Y_\sigma$  and into the right-hand side, could be made linear and similar with respect to the function corresponding to it:

$$\left\{ \frac{d^2}{dr^2} + \frac{2(Z - Y_\sigma)}{r} - \frac{l_\sigma(l_\sigma + 1)}{r^2} - \lambda_{\sigma\sigma} \right\} P_{\sigma\sigma} = \int_0^\infty K_\sigma(r, r') P_\sigma(r') dr'. \quad (5)$$

Let us agree that:

in order to compute the solution of the system in Eq. (1), suitable additional conditions in Eqs. (2) and (3) belong to the configurations  $(n_1 l_1)^{q_1} \dots (n_s l_s)^{q_s}$ , if each function  $P_\sigma$  of this solution is the  $(n_\sigma - l_\sigma - 1)$ th eigenfunction of the corresponding linear operator in Eqs. (5) and (2). (6)

The problem is solved by the method of successively making the functions more precise. Let there be a certain approximation  $\{\tilde{P}_\sigma\}$  with a desired solution  $\{P_\sigma\}$ . Let us assume that the function made more precise has the index number  $\sigma_1$ . The used approximate function  $\tilde{P}_{\sigma_1}$  made the equation linear with the index  $\sigma_1$ . For the new, more precise approximation we shall normalize to unity the  $(n_{\sigma_1} - l_{\sigma_1} - 1)$ th eigenfunction of the problem. Having next selected another number,  $\sigma_2$ , we shall define  $P_{\sigma_2}$ , etc. The approximate zero must be prepared beforehand and may be established by different methods as, for instance,

by means of analytical functions or the interpolative method of Hartree. It is simpler to assume that all  $P_\sigma \equiv 0$ . If it is agreed to begin with the functions of the inner shells and move in the direction of the outer shells, then the approximation will not be bad.

The  $(n_\sigma - l_\sigma - 1)$ th eigenfunction and the corresponding eigenvalue of the problem in Eqs. (5) and (2) in its turn is usually found by the method of successive approximation: the  $(m+1)$  approximation is  $P_\sigma^{(m+1)}$ , and  $\lambda_\sigma^{(m+1)}$  is found through approximation from the equation (the index  $\sigma$  decreases):

$$\left\{ \frac{d^2}{dr^2} + \frac{2(Z - Y^{(m)})}{r} - \frac{l(l+1)}{r^2} \right\} P^{(m+1)} = \lambda^{(m+1)} P^{(m+1)} + \int K^{(m)}(r, r') P^{(m+1)}(r') dr', \quad (7)$$

provided that

$$P^{(m+1)}(0) = P^{(m+1)}(\infty) = 0$$

and for any condition of normalization. Functions  $P^{(m)}$  are normalized provided that all normalizations of  $m$  are done in the same manner. If it is necessary in achieving the solution, it is possible to renormalize by virtue of the uniformity of the problem in Eqs. (5) and (2). In practice, it is convenient [Eq. (3)] to normalize functions to unity at some point  $r_1$ :

$$P(r_1) = 1.$$

Thus, at each successive approximation one must find such a  $\lambda$  and, corresponding to it, its solution  $P$  of the equation:

$$\frac{d^2 P}{dr^2} + FP = \lambda P + Q, \quad (8)$$

if

$$P(0) = P(\infty) = 0 \quad (9)$$

and

$$P(r_1) = 1. \quad (10)$$

Let  $P_0(r, \lambda)$  be the solution of Eq. (8) satisfying the supplementary conditions

$$P_0(0, \lambda) = 0, \quad P_0(r_1, \lambda) = 1.$$

At the point  $r_2$ , where  $r_2 > r_1$ , the function  $P_0$  acquires a certain value  $P_0(r_2, \lambda)$ . We shall now determine the function  $P_\infty(r, \lambda)$  as a solution of Eq. (8) with the conditions

$$P_\infty(r_2, \lambda) = P_0(r_2, \lambda), \quad P_\infty(\infty, \lambda) = 0.$$

With  $h > 0$  and fixed values  $r_1$  and  $r_2$ , the expression

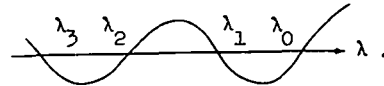
$$w(\lambda) = \frac{1}{h} \{ P_0(r_2 + h) - P_\infty(r_2 + h) \}$$

represents a certain function  $\lambda$ . It is obvious that those  $\lambda$ 's, for which the solution of Eq. (8) with zero conditions at the boundaries of Eq. (9), satisfying the conditions of normalization in Eq. (10), will be the roots of the equation

$$w(\lambda) = 0. \quad (11)$$

The sought  $\lambda$  is distinguished from the other roots by the fact that the solution of Eq. (8)  $(n - l - 1)$  is once converted into zero in the interval  $(r_1, r_2)$ . With the corresponding choice of  $r_1$  and  $r_2$  (at which we later stop), this is equivalent to the condition in Eq. (6).

If the unknown root is separated from the rest by the values  $\lambda'$  and  $\lambda''$ , it is easily found to an assigned degree of accuracy by the chord method. The boundaries  $\lambda'$  and  $\lambda''$  are found by successive trials. In the progression from one trial value to the next, one can be guided by the fact that the trial value must be increased if the number of nodes is greater than  $n - l - 1$  at the function  $P_0$ , and decreased if the number of nodes is less than  $n - l - 1$ . If the number of nodes is equal to  $n - l - 1$ , the direction of change of the trial  $\lambda$  can be defined by the symbol  $w(\lambda)$ . The function  $w(\lambda)$  is constant with respect to  $\lambda$ , and, if  $\lambda$  is sufficiently large, then  $w(\lambda) > 0$ . Thus the graph of the function  $w(\lambda)$  appears as:



It is obvious that for a located root with an even number, the trial value  $\lambda$  must be increased when  $w < 0$  and decreased when  $w > 0$ . If the sought root has an uneven number, then the process must be reversed. Roots are computed by means of numeration starting with a large number to which has been attributed a neutral number. This rule is easy to express analytically:

$$\lambda' = \lambda \left\{ 1 + \alpha_1 \frac{\text{sign}(\xi - n + l + 1)}{n} \right\}, \quad (12)$$

when  $\xi \neq n - l - 1$  and

$$\lambda' = \lambda \left\{ 1 + \alpha_2 \frac{(-1)^{n-1} \text{sign } w(\lambda)}{n} \right\}, \quad (13)$$

if  $\xi = n - l - 1$ . Here  $\xi$  is the number-changing sign at the function  $P_0$  in the interval  $(r_1, r_2)$ , but  $\alpha_1$  and  $\alpha_2$  are positive constants determining the magnitude of change of experimental  $\lambda$  values.

This completes one step in the sequence of making the functions more precise.

At each such step it is necessary to calculate the functions

$$F = F_\sigma = \frac{2(Z - Y_\sigma)}{r} - \frac{l_\sigma(l_\sigma + 1)}{r^2} - \lambda_{\sigma\sigma},$$

$$Q = Q_\sigma = -\frac{1}{2} \sum_{\sigma' \neq \sigma} P_{\sigma'} \sum_k \gamma_{\sigma\sigma'k} Y_{\sigma\sigma'k},$$

which in the main comes down to the calculation of  $Y_{\sigma\sigma'k}$ . Designated by  $Z_{\sigma\sigma'k}$  the first item in Eq. (1) for  $Y_{\sigma\sigma'k}$  is:

$$Z_{\sigma\sigma'k} = \frac{1}{r^k} \int_0^r r^k P_\sigma P_{\sigma'} dr.$$

It is obvious that  $Z_{\sigma\sigma'k}(0) = 0$  and  $Y_{\sigma\sigma'k} - Z_{\sigma\sigma'k} \rightarrow 0$  as  $r \rightarrow \infty$ . By direct differentiation we are satisfied that

$$Z'_{\sigma\sigma'k} = -\frac{k}{r} Z_{\sigma\sigma'k} + P_\sigma P_{\sigma'},$$

$$Y'_{\sigma\sigma'k} = \frac{k+1}{r} Y_{\sigma\sigma'k} - \frac{2k+1}{r} Z_{\sigma\sigma'k}.$$

By such means, the calculation  $Y_{\sigma\sigma'k}$  is arrived at by successive integrations of equations of the first order.<sup>15</sup> From consideration of stability, the first of these is integrated from 0 to  $\infty$  for the beginning condition  $Z_{\sigma\sigma'k} = 0$ ; the second, in the converse direction, whereupon  $Y_{\sigma\sigma'k} = Z_{\sigma\sigma'k}$  as  $r \rightarrow \infty$ .

A peculiarity for  $r = 0$  in Eq. (1) makes a varying  $r$  an inconvenient numerical realization of the described method. In the first place, it is complicated to use the formulas of integral equations; in the second place, the integration step has to be changed numerous times. These tend to violate the process of the operation cycles, blocking programs and significantly increasing their size.

One way to surmount these difficulties is to substitute appropriate variables. One could expect that a good variable would be

$$\rho = r + \ln r. \quad (14)$$

Actually, as  $r \rightarrow \infty$  the equations for  $P$  are close to the equations for the exponents and, therefore, there is no reason to change the step of integration by means of larger  $r$ 's. Accordingly,  $P$  for the larger  $r$ 's is almost equal to  $r$ . For  $r \sim 0$ ,  $P \sim r^{l+1}$ . As in the case of  $\rho \sim \ln r$ , then, relative to the variable  $\rho$ ,  $P \sim e^{(l+1)\rho}$  and it is again not necessary to change the step of integration according to  $\rho$ . By such means, to make use of variable  $\rho$ , the step could be taken by means of a constant both as  $\rho \rightarrow \infty$  and as  $\rho \rightarrow -\infty$ .

The substitution of only one independent variable in the equation for functions  $P$  would keep the first derivative, which is undesirable. Therefore, there follow substitutions by means of an independent variable to combine with substitution function  $P$ . In accordance with Ref. 14, we assume:

$$f = \left( \frac{r}{1+r} \right)^{-\frac{1}{2}} P(r).$$

It is not difficult to reason that through such a transformed equation for  $P$ ,

$$\frac{d^2 P}{dr^2} + FP = Q$$

is changed into

$$\frac{d^2 f}{d\rho^2} + \frac{r^2}{(1+r)^2} \left\{ r^2 F - \frac{1}{(1+r)^2} \left( r + \frac{1}{4} \right) \right\} f = \left( \frac{r}{1+r} \right)^{\frac{3}{2}} Q, \quad (15)$$

for function  $f$ , and the equations for  $Z_{\sigma\sigma'k}$  and  $Y_{\sigma\sigma'k}$  assume the aspect

$$\left. \begin{aligned} Z'_{\sigma\sigma'k} &= -\frac{k}{1+z} Z_{\sigma\sigma'k} + \frac{r^2}{(1+r)^2} f_\sigma f_{\sigma'}, \\ Y'_{\sigma\sigma'k} &= \frac{k+1}{1+r} Y_{\sigma\sigma'k} - \frac{2k+1}{1+r} Z_{\sigma\sigma'k} \end{aligned} \right\}. \quad (16)$$

Additional conditions are:

$$\begin{aligned} f(-\infty) &= f(+\infty) = 0, \\ \int_{-\infty}^{+\infty} \left( \frac{r}{1+r} \right)^2 r^2 d\rho &= 1. \end{aligned}$$

The first approximation which must be done in the numerical derivation is the substitution of the numerous intervals for the final:  $\rho_- \leq \rho \leq \rho_+$ . Thus, it is necessary to remove the boundary condition from

$\pm \infty$  at points  $\rho_{\pm}$ . For us it will be sufficient to know the rough equations

$$q_+ = \frac{f_{\infty}(\rho_+ + h)}{f_{\infty}(\rho_+)} , q_- = \frac{f_0(\rho_-)}{f_0(\rho_- - h)} . \quad (17)$$

To find them, it is possible to take advantage of the method suggested by Hartree.<sup>15</sup>

The boundary condition  $Z(-\infty) = 0$  could similarly be removed. But inasmuch as  $Z$  decreases significantly more rapidly than  $f$  as  $\rho \rightarrow -\infty$ , it is possible, without disadvantage, simply to assume  $Z(\rho_-) = 0$ . For the function  $Y$ , the initial value pertains to the point  $\rho_+$ :

$$Y(\rho_+) = Z(\rho_+).$$

The second approximation consists of substituting a different differential equation. For the solution of equations of the first order, we take advantage of the formula

$$Y_{i+3} = Y_{i+2} + \frac{h}{24} (9Y'_{i+3} + 19Y'_{i+2} - 5Y'_{i+1} + Y'_i),$$

and for the second equation, the formula

$$Y_{i+1} - 2Y_i + Y_{i-1} = \frac{h^2}{12} (Y''_{i+1} + 10Y''_i + Y''_{i-1}). \quad (18)$$

Substituting in their derivatives, given in the equations, we obtain a convenient form for programming formulas:

$$Z_i = \frac{1}{1 + \frac{9kh}{24(1+r_i)}} \left\{ \left[ 1 - \frac{19kh}{25(1+r_{i-1})} \right] Z_{i-1} + \frac{5khZ_{i-2}}{24(1+r_{i-2})} - \frac{khZ_{i-3}}{24(1+r_{i-3})} + \frac{9hr_{i-1}^2 R_i}{24(1+r_{i-1})^2} \right. \\ \left. + \frac{19hr_{i-1}^2 R_{i-1}}{24(1+r_{i-1})^2} - \frac{5hr_{i-2}^2 R_{i-2}}{24(1+r_{i-2})^2} + \frac{hr_{i-3}^2 R_{i-3}}{24(1+r_{i-3})^2} \right\}, \quad (19)$$

$$Y_i = \frac{1}{1 + \frac{9h(k+1)}{24(1+r_i)}} \left\{ \left[ 1 - \frac{19h(k+1)}{24(1+r_{i+1})} \right] Y_{i+1} + \frac{5h(k+1)Y_{i+2}}{24(1+r_{i+2})} - \frac{h(k+1)Y_{i+3}}{24(1+r_{i+3})} + \frac{9h(k+1)Z_i}{24(1+r_i)} \right. \\ \left. + \frac{19h(2k+1)Z_{i+1}}{24(1+r_{i+1})} - \frac{5h(2k+1)Z_{i+2}}{24(1+r_{i+2})} + \frac{h(2k+1)Z_{i+3}}{24(1+r_{i+3})} \right\}, \quad (20)$$

where

$$R_i = R_{\sigma, \sigma', i} = f_{\sigma, i} f_{\sigma', i}$$

and

$$\left( 1 + \frac{h^2 F_{i+1}}{12} \right) f_{i+1} - \left( 2 - \frac{5h^2 F_i}{6} \right) f_i + \left( 1 + \frac{h^2 F_{i-1}}{12} \right) f_{i-1} \\ = - \frac{h^2}{12} (\bar{Q}_{i+1} + 10\bar{Q}_i + \bar{Q}_{i-1}), \quad (21)$$

$$\bar{Q}_i = \left( \frac{r_i}{1+r_i} \right)^2 Q_i .$$

Formulas in Eqs. (19) and (20) requires knowledge of the three initial values of  $Z$  and  $Y$ . In accordance with the accepted method of eliminating boundary conditions,

$$Z_{-3} = Z_{-2} = Z_{-1} = 0$$

and

$$Y_N = Z_N, Y_{N-1} = Z_{N-1}, Y_{N-2} = Z_{N-2},$$

where the zero index corresponds to point  $\rho_-$ , and index  $N$ , to point  $\rho_+$ .

For the construction of functions  $f_0$  and  $f_{\infty}$  (corresponding to  $P_0$  and  $P_{\infty}$ ), it is necessary first of all to choose points  $\rho_1$  and  $\rho_2$  corresponding to points  $r_1$  and  $r_2$ . For such points it is convenient to take those values of the argument  $\rho$  for which the  $f$  coefficient in Eq. (15) is reduced to zero. It can be demonstrated that there are always two such values of the argument.

In the interval  $[\rho_1, \rho_2]$ , both solutions of Eq. (15) oscillate, but in the interval  $[\rho_-, \rho_1]$  and  $[\rho_2, \rho_+]$ , one increases and the other decreases. Therefore, in different intervals, the calculation of functions has to be carried out differently. In the interval  $[\rho_-, \rho_1]$ , the function  $f_0$  is found by the method of "dispersion"<sup>25</sup> in its utilization with different equations [Eq. (21)]. By induction, we see that the values for  $f_{0,i}$  and  $f_{0,i+1}$  are allied in the relationship:

$$f_{0,i} = v_0(i, i+1)f_{0,i+1} + u_0(i, i+1), \quad (22)$$

in which

$$v_0(i, i+1) = \frac{A_{i+1}}{2B_i - A_i v_0(i-1, i)}, \quad (23)$$

$$u_0(i, i+1) = \frac{A_{i+1} u_0(i-1, i) + w_i}{2B_i - A_{i-1} v_0(i-1, i)}, \quad (24)$$

where

$$A_i = 1 + \frac{h^2 F_i}{12}, \quad 2B_i = 2 - \frac{5h^2 F_i}{6},$$

$$w_i = \frac{h^2}{12} (\bar{Q}_{i+1} + 10\bar{Q}_i + \bar{Q}_{i-1}).$$

According to the method of removal of boundary conditions in Eq. (17),

$$u_0(-1, 0) = q_-,$$

$$u_0(-1, 0) = 0.$$

From these initial equations, we calculate  $u_0(i, i+1)$  and  $u_0(i, i+1)$  according to the recurrence formulas in Eqs. (23) and (24) down to point  $\rho_1$ ; more precisely, until the  $\rho_1$  is near the node point. Since  $f_0(\rho_1) = 1$ , in all points of the interval  $[\rho_-, \rho_1]$ , the values of the sought function can be found by means of the formula in Eq. (22). Knowing  $f_0$  at the points  $\rho_1$  and  $\rho_1 - h$ , its value in the interval  $[\rho_1, \rho_2]$  can be found very well through the formula

$$f_{0,i+1} = \frac{2B_i f_{0,i} - A_{i-1} f_{0,i-1} + w_i}{A_{i+1}}$$

down to the point  $\rho_2 + h$ . Along the way are located a number of step changes of function  $f_0$ . In the interval  $[\rho_2, \rho_+]$ , the function  $f_\infty$  is found by the dispersion method.

Having obtained  $f_0(\rho_2 + h)$  and  $f_2(\rho_2 + h)$  by such means, it is possible to calculate  $w(\lambda)$ , and this is all that is necessary for the solution of the equation  $w(\lambda) = 0$ .

Coefficients of Eqs. (15) and (16) are expressed by the variable  $r$ . Therefore, for their calculations at a fixed value  $\rho$ , it is necessary first of all to calculate the corresponding  $r(\rho)$ , which is obviously arrived at with the solution of the equation

$$\varphi(r) = r + \ln r - \rho = 0. \quad (25)$$

Inasmuch as it is impossible to express  $r$  by  $\rho$  analytically, we are obliged to resort to the numerical method. It is convenient to apply Newton's method to Eq. (25):

$$r^{(p+1)} = r^{(p)} - \frac{\varphi(r^{(p)})}{\varphi'(r^{(p)})}.$$

$\varphi(r)$  is substituted here and

$$\varphi'(r) = 1 + \frac{1}{r},$$

yielding

$$r^{(p+1)} = r^{(p)} \left( 1 + \frac{\rho - r^{(p)} - \ln r^{(p)}}{1 + r^{(p)}} \right).$$

It is evident that

$$\frac{r^{(p+1)} - r^{(p)}}{r^{(p)}} = \frac{\rho - r^{(p)} - \ln r^{(p)}}{1 + r^{(p)}};$$

therefore, if the calculation of  $r$  is completed according to the inequality

$$\left| \frac{\rho - r^{(p)} - \ln r^{(p)}}{1 + r^{(p)}} \right| < \epsilon,$$

the sought-for value of  $r$  will be known with a fixed relative error  $\epsilon$ . The initial approximation for  $r$  can be obtained from the following considerations. For sufficiently large positive  $\rho$ ,  $r \sim \rho + \ln \rho$ . For sufficiently large negative  $\rho$ ,  $r \sim e^\rho$ . For an intermediate  $\rho$ ,  $r$  is approximated by  $r \approx a + bp + cp^2$ .

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He <sup>1</sup> S		Li <sup>2</sup> S		Be <sup>3</sup> S	
r	1s	1s	2s	1s	2s
0.001	0.005	0.009	0.001	0.015	0.003
0.002	0.009	0.018	0.003	0.029	0.005
0.004	0.019	0.037	0.006	0.058	0.011
0.006	0.028	0.055	0.008	0.086	0.016
0.008	0.037	0.072	0.011	0.114	0.021
0.010	0.047	0.090	0.014	0.141	0.026
0.015	0.069	0.133	0.021	0.207	0.038
0.020	0.091	0.174	0.027	0.271	0.049
0.025	0.113	0.215	0.033	0.332	0.060
0.030	0.134	0.254	0.039	0.390	0.071
0.035	0.155	0.292	0.045	0.447	0.081
0.040	0.176	0.329	0.051	0.500	0.091
0.050	0.215	0.399	0.062	0.601	0.109
0.060	0.253	0.465	0.072	0.694	0.126
0.070	0.290	0.526	0.081	0.778	0.141
0.080	0.324	0.584	0.090	0.855	0.154
0.090	0.358	0.638	0.098	0.925	0.167
0.100	0.390	0.688	0.106	0.988	0.178
0.120	0.450	0.779	0.120	1.097	0.196
0.140	0.505	0.858	0.131	1.185	0.210
0.160	0.555	0.925	0.141	1.254	0.220
0.180	0.601	0.983	0.149	1.306	0.226
0.200	0.643	1.031	0.155	1.345	0.230
0.220	0.681	1.072	0.160	1.371	0.230
0.240	0.715	1.105	0.164	1.387	0.229
0.260	0.746	1.131	0.167	1.394	0.225
0.280	0.773	1.151	0.168	1.393	0.219
0.300	0.798	1.167	0.168	1.385	0.211
0.350	0.849	1.185	0.165	1.343	0.186
0.400	0.885	1.181	0.158	1.278	0.154
0.450	0.910	1.160	0.147	1.198	0.117
0.500	0.924	1.126	0.132	1.111	0.077
0.550	0.930	1.084	0.116	1.021	0.034
0.600	0.930	1.036	0.097	0.931	-0.009
0.650	0.923	0.984	0.078	0.844	-0.053
0.700	0.912	0.930	0.057	0.762	-0.096
0.750	0.898	0.875	0.035	0.684	-0.138
0.800	0.880	0.820	0.013	0.612	-0.179
0.850	0.860	0.766	-0.009	0.546	-0.219
0.900	0.837	0.714	-0.032	0.485	-0.257
0.950	0.814	0.663	-0.054	0.430	-0.293
1.000	0.789	0.615	-0.076	0.380	-0.328
1.100	0.738	0.525	-0.120	0.296	-0.390
1.200	0.686	0.446	-0.163	0.228	-0.445
1.300	0.634	0.376	-0.204	0.175	-0.491
1.400	0.584	0.316	-0.242	0.134	-0.529
1.500	0.535	0.264	-0.278	0.102	-0.561
1.600	0.489	0.220	-0.311	0.077	-0.585
1.700	0.446	0.183	-0.342	0.059	-0.604
1.800	0.405	0.152	-0.370	0.044	-0.617
1.900	0.368	0.125	-0.395	0.033	-0.625
2.000	0.333	0.103	-0.418	0.025	-0.629
2.100	0.301	0.085	-0.438	0.019	-0.629
2.200	0.272	0.070	-0.456	0.014	-0.626
2.300	0.245	0.057	-0.471	0.011	-0.620
2.400	0.221	0.047	-0.484	0.008	-0.611
2.500	0.198	0.039	-0.495	0.006	-0.601
2.600	0.178	0.031	-0.504	0.004	-0.588
2.700	0.160	0.026	-0.511	0.003	-0.575
2.800	0.143	0.021	-0.517	0.002	-0.560
2.900	0.128	0.017	-0.520	0.002	-0.544
3.000	0.115	0.014	-0.522	0.001	-0.528

r	1s	1s	2s	1s	2s
3.200	0.092	0.009	-0.522	0.001	-0.494
3.400	0.073	0.006	-0.518	0.	-0.459
3.600	0.058	0.004	-0.509	0.	-0.424
3.800	0.046	0.003	-0.497	0.	-0.390
4.000	0.036	0.002	-0.482	0.	-0.357
4.200	0.029	0.001	-0.465	0.	-0.328
4.400	0.023	0.001	-0.446	0.	-0.297
4.600	0.018	0.	-0.427	0.	-0.269
4.800	0.014	0.	-0.406	0.	-0.243
5.000	0.011	0.	-0.386	0.	-0.219
5.200	0.009	0.	-0.365	0.	-0.197
5.400	0.007	0.	-0.344	0.	-0.177
5.600	0.005	0.	-0.324	0.	-0.159
5.800	0.004	0.	-0.304	0.	-0.142
6.000	0.003	0.	-0.284	0.	-0.127
6.200	0.003	0.	-0.265	-0.	-0.113
6.400	0.002	0.	-0.247	-0.	-0.101
6.600	0.002	0.	-0.230	-0.	-0.090
6.800	0.001	0.	-0.214	-0.	-0.080
7.000	0.001	0.	-0.198	-0.	-0.071
7.200	0.001	0.	-0.184	-0.	-0.063
7.400	0.001	0.	-0.170	-0.	-0.058
7.600	0.	0.	-0.157	-0.	-0.049
7.800	0.	0.	-0.145	-0.	-0.043
8.000	0.	0.	-0.133	-0.	-0.038
8.200	0.	0.	-0.123	-0.	-0.034
8.400	0.	0.	-0.113	-0.	-0.030
8.600	0.	0.	-0.103	-0.	-0.026
8.800	0.	0.	-0.095	-0.	-0.023
9.000	0.	0.	-0.087	-0.	-0.020
9.500	0.	0.	-0.070	-0.	-0.015
10.000	0.	0.	-0.055	-0.	-0.011
10.500	0.	0.	-0.044	-0.	-0.008
11.000	0.	0.	-0.035	-0.	-0.005
11.500	0.	0.	-0.027	-0.	-0.004
12.000	0.	0.	-0.021	-0.	-0.003
12.500	0.	0.	-0.017	-0.	-0.002
13.000	0.	0.	-0.013	-0.	-0.001
13.500	0.	0.	-0.010	-0.	-0.001
14.000	0.	0.	-0.008	-0.	-0.001
14.500	0.	0.	-0.006	-0.	-0.
15.000	0.	-0.	-0.005	-0.	-0.
15.500	0.	-0.	-0.004	-0.	-0.
16.000	0.	-0.	-0.003	-0.	-0.
16.500	0.	-0.	-0.002	-0.	-0.
17.000	0.	-0.	-0.002	-0.	-0.
17.500	0.	-0.	-0.001	-0.	-0.
18.000	0.	-0.	-0.001	-0.	-0.
18.500	0.	-0.	-0.001	-0.	-0.
19.000	0.	0.	-0.001	-0.	-0.

$\lambda$	1s	1s	2s	1s	2s
$\lambda$	1.84	4.96	0.393	9.46	0.610
$\langle r^{-2} \rangle$	5.99	14.9	0.430	27.7	1.05
$\langle r^{-1} \rangle$	1.69	2.89	0.345	3.68	0.522
$\langle r \rangle$	0.927	0.573	3.87	0.415	2.65
$\langle r^2 \rangle$	1.18	0.446	17.7	0.233	8.43

Li <sup>+</sup> <sup>1</sup> S		Be <sup>+</sup> <sup>2</sup> S		B <sup>+</sup> <sup>3</sup> S	
r	1s	1s	2s	1s	2s
0.001	0.009	0.015	0.003	0.021	0.005
0.002	0.018	0.029	0.005	0.041	0.009
0.004	0.037	0.058	0.011	0.082	0.018
0.006	0.055	0.086	0.016	0.121	0.027
0.008	0.072	0.113	0.021	0.160	0.036
0.010	0.090	0.141	0.026	0.198	0.044





r	1s	1s	2s	1s	2s
0.350	1.344	1.364	0.171	1.294	0.049
0.400	1.278	1.238	0.089	1.119	-0.068
0.450	1.198	1.107	0.003	0.954	-0.182
0.500	1.111	0.979	-0.084	0.804	-0.282
0.550	1.021	0.858	-0.169	0.672	-0.393
0.600	0.931	0.746	-0.252	0.557	-0.486
0.650	0.844	0.645	-0.330	0.459	-0.569
0.700	0.761	0.555	-0.403	0.376	-0.641
0.750	0.683	0.475	-0.470	0.307	-0.703
0.800	0.611	0.405	-0.531	0.250	-0.756
0.850	0.544	0.344	-0.586	0.202	-0.799
0.900	0.483	0.291	-0.634	0.164	-0.833
0.950	0.428	0.246	-0.677	0.132	-0.859
1.000	0.379	0.208	-0.713	0.106	-0.877
1.100	0.294	0.147	-0.769	0.068	-0.895
1.200	0.227	0.103	-0.805	0.044	-0.890
1.300	0.174	0.072	-0.822	0.028	-0.869
1.400	0.132	0.050	-0.825	0.018	-0.836
1.500	0.101	0.034	-0.815	0.011	-0.793
1.600	0.076	0.024	-0.795	0.007	-0.746
1.700	0.057	0.016	-0.767	0.004	-0.694
1.800	0.043	0.011	-0.734	0.003	-0.642
1.900	0.032	0.008	-0.696	0.002	-0.589
2.000	0.024	0.005	-0.656	0.001	-0.538
2.100	0.018	0.004	-0.615	0.001	-0.489
2.200	0.013	0.002	-0.572	0.	-0.442
2.300	0.010	0.002	-0.531	0.	-0.398
2.400	0.007	0.001	-0.490	0.	-0.357
2.500	0.005	0.001	-0.450	0.	-0.319
2.600	0.004	0.001	-0.412	0.	-0.284
2.700	0.003	0.	-0.376	0.	-0.253
2.800	0.002	0.	-0.342	0.	-0.224
2.900	0.002	0.	-0.311	0.	-0.198
3.000	0.001	0.	-0.281	0.	-0.175
3.200	0.001	0.	-0.229	0.	-0.135
3.400	0.	0.	-0.184	0.	-0.104
3.600	0.	0.	-0.148	0.	-0.079
3.800	0.	0.	-0.117	0.	-0.060
4.000	0.	0.	-0.093	0.	-0.045
4.200	0.	0.	-0.073	0.	-0.034
4.400	0.	0.	-0.057	-0.	-0.026
4.600	0.	0.	-0.045	-0.	-0.019
4.800	0.	0.	-0.035	-0.	-0.014
5.000	0.	0.	-0.027	-0.	-0.011
5.200	0.	0.	-0.021	-0.	-0.008
5.400	0.	0.	-0.016	-0.	-0.006
5.600	0.	0.	-0.012	-0.	-0.004
5.800	0.	0.	-0.009	-0.	-0.003
6.000	0.	0.	-0.007	-0.	-0.002
6.200	0.	0.	-0.005	0.	-0.002
6.400	0.	0.	-0.004	0.	-0.001
6.600	0.	0.	-0.003	0.	-0.001
6.800	0.	0.	-0.002	0.	-0.001
7.000	0.	0.	-0.002	0.	-0.
7.200	0.	0.	-0.001	0.	-0.
7.400	0.	0.	-0.001	0.	-0.
7.600	0.	0.	-0.001	0.	-0.
7.800	0.	0.	-0.001	0.	-0.
$\lambda$	11.3	17.6	2.78	25.3	3.39
$\langle r^{-2} \rangle$	27.7	44.5	2.93	65.2	4.27
$\langle r^{-1} \rangle$	3.69	4.68	0.860	5.88	1.03
$\langle r \rangle$	0.444	0.325	1.64	0.287	1.37
$\langle r^2 \rangle$	0.232	0.142	3.13	0.096	2.21

### B 'P

r	1s	2s	2p
0.001	0.021	0.004	0.
0.002	0.041	0.008	0.
0.004	0.082	0.016	0.
0.006	0.121	0.024	0.
0.008	0.160	0.032	0.
0.010	0.198	0.040	0.
0.015	0.290	0.059	0.001
0.020	0.377	0.076	0.001
0.025	0.460	0.093	0.002
0.030	0.538	0.108	0.003
0.035	0.613	0.123	0.004
0.040	0.683	0.137	0.005
0.050	0.813	0.163	0.007
0.060	0.928	0.186	0.010
0.070	1.031	0.206	0.014
0.080	1.122	0.223	0.017
0.090	1.202	0.238	0.021
0.100	1.272	0.251	0.026
0.120	1.385	0.270	0.036
0.140	1.467	0.281	0.046
0.160	1.523	0.286	0.058
0.180	1.557	0.286	0.070
0.200	1.573	0.281	0.083
0.220	1.574	0.272	0.096
0.240	1.562	0.259	0.110
0.260	1.540	0.243	0.124
0.280	1.510	0.225	0.139
0.300	1.474	0.204	0.153
0.350	1.364	0.146	0.190
0.400	1.238	0.081	0.226
0.450	1.107	0.012	0.263
0.500	0.980	-0.058	0.298
0.550	0.859	-0.127	0.332
0.600	0.748	-0.193	0.364
0.650	0.647	-0.257	0.395
0.700	0.557	-0.317	0.423
0.750	0.477	-0.373	0.450
0.800	0.408	-0.424	0.475
0.850	0.347	-0.471	0.498
0.900	0.294	-0.514	0.519
0.950	0.249	-0.552	0.539
1.000	0.210	-0.586	0.556
1.100	0.149	-0.641	0.585
1.200	0.105	-0.681	0.608
1.300	0.074	-0.708	0.624
1.400	0.052	-0.724	0.631
1.500	0.036	-0.730	0.640
1.600	0.025	-0.728	0.642
1.700	0.018	-0.720	0.639
1.800	0.012	-0.706	0.634
1.900	0.009	-0.688	0.626
2.000	0.006	-0.668	0.615
2.100	0.004	-0.644	0.602
2.200	0.003	-0.619	0.588
2.300	0.002	-0.593	0.573
2.400	0.002	-0.566	0.557
2.500	0.001	-0.539	0.540
2.600	0.001	-0.512	0.522
2.700	0.001	-0.485	0.504
2.800	0.	-0.459	0.486
2.900	0.	-0.433	0.468
3.000	0.	-0.408	0.450
3.200	0.	-0.361	0.414
3.400	0.	-0.318	0.379
3.600	0.	-0.278	0.345

r	1s	2s	2p	r	1s	2s	2p
3.800	0.	-0.243	0.314	0.120	1.636	0.333	0.060
4.000	0.	-0.211	0.284	0.140	1.699	0.337	0.077
4.200	0.	-0.183	0.257	0.160	1.731	0.332	0.096
4.400	0.	-0.158	0.231	0.180	1.736	0.320	0.115
4.600	0.	-0.136	0.208	0.200	1.720	0.301	0.135
4.800	0.	-0.117	0.187	0.220	1.689	0.277	0.155
5.000	0.	-0.101	0.167	0.240	1.645	0.249	0.176
5.200	0.	-0.086	0.149	0.260	1.591	0.217	0.197
5.400	0.	-0.074	0.133	0.280	1.531	0.183	0.218
5.600	0.	-0.063	0.119	0.300	1.466	0.147	0.239
5.800	0.	-0.054	0.105				
6.000	0.	-0.046	0.094	0.350	1.294	0.050	0.290
6.200	0.	-0.039	0.083	0.400	1.120	-0.050	0.340
6.400	0.	-0.033	0.074	0.450	0.956	-0.148	0.386
6.600	0.	-0.028	0.065	0.500	0.807	-0.243	0.430
6.800	0.	-0.024	0.058	0.550	0.675	-0.332	0.470
7.000	0.	-0.020	0.051	0.600	0.561	-0.413	0.506
7.200	0.	-0.017	0.045	0.650	0.463	-0.487	0.538
7.400	0.	-0.014	0.040	0.700	0.381	-0.552	0.567
7.600	0.	-0.012	0.035	0.750	0.312	-0.609	0.592
7.800	0.	-0.010	0.031	0.800	0.254	-0.658	0.614
8.000	0.	-0.009	0.027	0.850	0.207	-0.700	0.633
8.200	0.	-0.007	0.024	0.900	0.168	-0.734	0.649
8.400	0.	-0.006	0.021	0.950	0.136	-0.762	0.661
8.600	0.	-0.005	0.018	1.000	0.110	-0.784	0.672
8.800	0.	-0.004	0.016				
9.000	0.	-0.004	0.014	1.100	0.071	-0.811	0.685
				1.200	0.046	-0.821	0.691
9.500	0.	-0.002	0.010	1.300	0.030	-0.816	0.690
10.000	0.	-0.002	0.007	1.400	0.020	-0.800	0.684
10.500	0.	-0.001	0.005	1.500	0.013	-0.776	0.674
11.000	0.	-0.001	0.004	1.600	0.008	-0.746	0.660
11.500	0.	-0.	0.003	1.700	0.006	-0.712	0.644
12.000	0.	-0.	0.002	1.800	0.004	-0.676	0.625
12.500	0.	-0.	0.001	1.900	0.003	-0.637	0.606
13.000	0.	-0.	0.001	2.000	0.002	-0.599	0.585
13.500	0.	-0.	0.001	2.100	0.001	-0.561	0.564
				2.200	0.001	-0.523	0.543
				2.300	0.001	-0.486	0.521
				2.400	0.001	-0.451	0.500
				2.500	0.	-0.418	0.478
				2.600	0.	-0.386	0.457
				2.700	0.	-0.356	0.437
				2.800	0.	-0.328	0.417
				2.900	0.	-0.301	0.397
				3.000	0.	-0.276	0.379

$\lambda$	1s	2s	2p
44.4	2.02	0.530	0.530
4.67	0.713	0.605	0.605
0.326	1.98	2.20	2.20
0.143	4.71	6.14	6.14

**C 1S**

r	1s	2s	2p	r	1s	2s	2p
0.001	0.027	0.006	0.	3.200	0.	-0.232	0.343
0.002	0.055	0.012	0.	3.400	0.	-0.194	0.309
				3.600	0.	-0.162	0.278
				3.800	0.	-0.134	0.250
				4.000	0.	-0.111	0.224
				4.200	0.	-0.092	0.201
				4.400	0.	-0.076	0.179
				4.600	0.	-0.063	0.160
				4.800	0.	-0.051	0.143
				5.000	0.	-0.042	0.127
				5.200	0.	-0.035	0.113
				5.400	0.	-0.028	0.100
				5.600	0.	-0.023	0.089
				5.800	0.	-0.019	0.079
				6.000	0.	-0.015	0.070
				6.200	0.	-0.013	0.062
				6.400	0.	-0.010	0.054
				6.600	0.	-0.008	0.048
				6.800	0.	-0.007	0.042
				7.000	0.	-0.006	0.037
				7.200	0.	-0.005	0.033
				7.400	0.	-0.004	0.029
				7.600	0.	-0.003	0.025
				7.800	0.	-0.002	0.022
				8.000	0.	-0.002	0.020
				8.200	0.	-0.002	0.017
				8.400	0.	-0.001	0.015

r	1s	2s	2p
8.600	0.	-0.001	0.013
8.800	0.	-0.001	0.012
9.000	0.	-0.001	0.010
9.500	0.	-0.	0.007
10.000	0.	-0.	0.005
10.500	0.	-0.	0.004
11.000	0.	-0.	0.003
11.500	0.	-0.	0.002
12.000	0.	-0.	0.001
12.500	0.	-0.	0.001
13.000	0.	-0.	0.001
$\lambda$	22.8	1.48	0.620
$\langle r^{-2} \rangle$	65.0	3.32	0.820
$\langle r^{-1} \rangle$	5.67	0.907	0.741
$\langle r \rangle$	0.268	1.57	1.87
$\langle r^2 \rangle$	0.097	2.98	4.59

**C<sup>3</sup>P**

r	1s	2s	2p
0.001	0.027	0.006	0.
0.002	0.055	0.012	0.
0.004	0.108	0.023	0.
0.006	0.160	0.034	0.
0.008	0.211	0.045	0.
0.010	0.261	0.056	0.001
0.015	0.379	0.081	0.001
0.020	0.491	0.104	0.002
0.025	0.596	0.127	0.004
0.030	0.694	0.147	0.005
0.035	0.786	0.167	0.007
0.040	0.872	0.185	0.009
0.050	1.027	0.217	0.013
0.060	1.162	0.244	0.018
0.070	1.278	0.268	0.024
0.080	1.377	0.287	0.031
0.090	1.461	0.302	0.038
0.100	1.531	0.314	0.046
0.120	1.635	0.329	0.062
0.140	1.699	0.333	0.080
0.160	1.730	0.328	0.100
0.180	1.735	0.316	0.120
0.200	1.720	0.297	0.141
0.220	1.688	0.274	0.162
0.240	1.644	0.246	0.184
0.260	1.591	0.215	0.206
0.280	1.531	0.181	0.228
0.300	1.466	0.146	0.250
0.350	1.294	0.051	0.304
0.400	1.120	-0.048	0.356
0.450	0.956	-0.145	0.405
0.500	0.807	-0.239	0.450
0.550	0.675	-0.326	0.493
0.600	0.561	-0.407	0.532
0.650	0.464	-0.479	0.566
0.700	0.381	-0.544	0.597
0.750	0.312	-0.601	0.624
0.800	0.255	-0.649	0.647
0.850	0.207	-0.691	0.667
0.900	0.168	-0.725	0.684
0.950	0.136	-0.753	0.698
1.000	0.110	-0.775	0.708

r	1s	2s	2p
1.100	0.072	-0.804	0.722
1.200	0.047	-0.814	0.727
1.300	0.030	-0.811	0.724
1.400	0.020	-0.796	0.716
1.500	0.013	-0.774	0.702
1.600	0.009	-0.745	0.684
1.700	0.006	-0.713	0.664
1.800	0.004	-0.678	0.641
1.900	0.003	-0.641	0.617
2.000	0.002	-0.603	0.592
2.100	0.001	-0.566	0.566
2.200	0.001	-0.529	0.540
2.300	0.001	-0.493	0.513
2.400	0.001	-0.458	0.487
2.500	0.	-0.425	0.462
2.600	0.	-0.394	0.437
2.700	0.	-0.364	0.413
2.800	0.	-0.335	0.389
2.900	0.	-0.309	0.367
3.000	0.	-0.284	0.345
3.200	0.	-0.240	0.305
3.400	0.	-0.201	0.268
3.600	0.	-0.168	0.235
3.800	0.	-0.140	0.205
4.000	0.	-0.116	0.179
4.200	0.	-0.096	0.155
4.400	0.	-0.080	0.135
4.600	0.	-0.066	0.117
4.800	0.	-0.054	0.101
5.000	0.	-0.045	0.087
5.200	0.	-0.037	0.075
5.400	0.	-0.030	0.064
5.600	0.	-0.025	0.055
5.800	0.	-0.020	0.048
6.000	0.	-0.016	0.041
6.200	0.	-0.013	0.035
6.400	0.	-0.011	0.030
6.600	0.	-0.009	0.026
6.800	0.	-0.007	0.022
7.000	0.	-0.006	0.019
7.200	0.	-0.005	0.016
7.400	0.	-0.004	0.014
7.600	0.	-0.003	0.012
7.800	0.	-0.003	0.010
8.000	0.	-0.002	0.008
8.200	0.	-0.002	0.007
8.400	0.	-0.001	0.006
8.600	0.	-0.001	0.005
8.800	0.	-0.001	0.004
9.000	0.	-0.001	0.004
9.500	0.	-0.	0.002
10.000	0.	-0.	0.002
10.500	0.	-0.	0.001
11.000	0.	-0.	0.001
$\lambda$	22.6	1.41	0.867
$\langle r^{-2} \rangle$	65.0	3.24	0.892
$\langle r^{-1} \rangle$	5.66	0.897	0.784
$\langle r \rangle$	0.268	1.59	1.71
$\langle r^2 \rangle$	0.097	3.05	3.75

**C<sup>1</sup>D**

r	1s	2s	2p
0.001	0.027	0.006	0.
0.002	0.055	0.012	0.

r	1s	2s	2p	r	1s	2s	2p
0.004	0.108	0.023	0	4.800	0.	-0.053	0.111
0.006	0.160	0.034	0	5.000	0.	-0.044	0.097
0.008	0.211	0.045	0	5.200	0.	-0.036	0.084
0.010	0.261	0.056	0.004	5.400	0.	-0.030	0.073
				5.600	0.	-0.024	0.063
0.015	0.379	0.081	0.001	5.800	0.	-0.020	0.055
0.020	0.491	0.105	0.002	6.000	0.	-0.016	0.047
0.025	0.596	0.127	0.003	6.200	0.	-0.013	0.041
0.030	0.694	0.148	0.005	6.400	0.	-0.011	0.035
0.035	0.786	0.167	0.007	6.600	0.	-0.009	0.030
0.040	0.872	0.185	0.009	6.800	0.	-0.007	0.026
				7.000	0.	-0.006	0.023
0.050	1.027	0.218	0.013	7.200	0.	-0.005	0.019
0.060	1.162	0.245	0.018	7.400	0.	-0.004	0.017
0.070	1.278	0.268	0.024	7.600	0.	-0.003	0.014
0.080	1.377	0.288	0.031	7.800	0.	-0.003	0.012
0.090	1.461	0.303	0.038	8.000	0.	-0.002	0.011
0.100	1.531	0.315	0.045	8.200	0.	-0.002	0.009
				8.400	0.	-0.001	0.008
0.120	1.635	0.330	0.062	8.600	0.	-0.001	0.007
0.140	1.699	0.334	0.080	8.800	0.	-0.001	0.006
0.160	1.730	0.329	0.099	9.000	0.	-0.001	0.005
0.180	1.735	0.317	0.119				
0.200	1.720	0.298	0.139	9.500	0.	-0.	0.003
0.220	1.688	0.275	0.161	10.000	0.	-0.	0.002
0.240	1.644	0.247	0.182	10.500	0.	-0.	0.001
0.260	1.591	0.216	0.204	11.000	0.	-0.	0.001
0.280	1.531	0.182	0.225	11.500	0.	-0.	0.001
0.300	1.466	0.146	0.247				
				$\lambda$	22.7	1.43	0.797
0.350	1.294	0.050	0.300	$\langle r^{-1} \rangle$	65.0	3.26	0.873
0.400	1.120	-0.048	0.352	$\langle r^{-2} \rangle$	5.66	0.899	0.772
0.450	0.956	-0.146	0.400	$\langle r^{-3} \rangle$	0.268	1.58	1.75
0.500	0.807	-0.240	0.445	$\langle r^{-4} \rangle$	0.087	3.03	3.94
0.550	0.675	-0.328	0.487				
0.600	0.561	-0.408	0.525				
0.650	0.463	-0.481	0.559				
0.700	0.381	-0.546	0.589				
0.750	0.312	-0.603	0.616				
0.800	0.254	-0.652	0.639				
0.850	0.207	-0.693	0.658				
0.900	0.168	-0.728	0.675				
0.950	0.136	-0.756	0.688				
1.000	0.110	-0.777	0.699				
1.100	0.072	-0.806	0.712				
1.200	0.047	-0.816	0.718				
1.300	0.030	-0.812	0.715				
1.400	0.020	-0.797	0.708				
1.500	0.013	-0.774	0.695				
1.600	0.009	-0.746	0.678				
1.700	0.006	-0.713	0.659				
1.800	0.004	-0.677	0.638				
1.900	0.003	-0.640	0.615				
2.000	0.002	-0.602	0.591				
2.100	0.001	-0.564	0.566	0.015	0.380	0.087	0.002
2.200	0.001	-0.527	0.542	0.020	0.491	0.112	0.003
2.300	0.001	-0.491	0.517	0.025	0.596	0.136	0.004
2.400	0.001	-0.456	0.492	0.030	0.694	0.158	0.006
2.500	0.	-0.423	0.468	0.035	0.786	0.179	0.008
2.600	0.	-0.392	0.444	0.040	0.872	0.199	0.010
2.700	0.	-0.362	0.420				
2.800	0.	-0.333	0.398	0.050	1.028	0.233	0.015
2.900	0.	-0.307	0.376	0.060	1.162	0.263	0.022
3.000	0.	-0.282	0.355	0.070	1.279	0.287	0.028
				0.080	1.378	0.308	0.036
3.200	0.	-0.238	0.316	0.090	1.462	0.324	0.045
3.400	0.	-0.199	0.279	0.100	1.532	0.337	0.054
3.600	0.	-0.166	0.247				
3.800	0.	-0.139	0.217	0.120	1.838	0.353	0.073
4.000	0.	-0.115	0.191	0.140	1.700	0.357	0.094
4.200	0.	-0.095	0.167	0.160	1.731	0.352	0.117
4.400	0.	-0.079	0.146	0.180	1.730	0.338	0.140
4.600	0.	-0.065	0.128	0.200	1.721	0.318	0.165
				0.220	1.889	0.293	0.190

**C<sup>+</sup> 2P**

r	1s	2s	2p
0.240	1.645	0.263	0.215
0.260	1.592	0.229	0.241
0.280	1.531	0.192	0.266
0.300	1.468	0.154	0.292
0.350	1.294	0.051	0.354
0.400	1.120	-0.056	0.414
0.450	0.956	-0.161	0.470
0.500	0.806	-0.262	0.522
0.550	0.674	-0.356	0.569
0.600	0.560	-0.442	0.612
0.650	0.462	-0.520	0.649
0.700	0.380	-0.588	0.682
0.750	0.310	-0.648	0.710
0.800	0.253	-0.699	0.734
0.850	0.206	-0.741	0.753
0.900	0.167	-0.776	0.768
0.950	0.135	-0.804	0.779
1.000	0.109	-0.824	0.787
1.100	0.071	-0.849	0.793
1.200	0.046	-0.854	0.789
1.300	0.029	-0.843	0.775
1.400	0.019	-0.821	0.755
1.500	0.012	-0.790	0.729
1.600	0.008	-0.753	0.700
1.700	0.005	-0.711	0.667
1.800	0.003	-0.668	0.633
1.900	0.002	-0.624	0.598
2.000	0.001	-0.579	0.562
2.100	0.001	-0.535	0.527
2.200	0.001	-0.493	0.492
2.300	0.001	-0.452	0.458
2.400	0.	-0.414	0.426
2.500	0.	-0.377	0.394
2.600	0.	-0.343	0.364
2.700	0.	-0.311	0.336
2.800	0.	-0.282	0.309
2.900	0.	-0.255	0.284
3.000	0.	-0.230	0.261
3.200	0.	-0.186	0.218
3.400	0.	-0.150	0.182
3.600	0.	-0.120	0.151
3.800	0.	-0.096	0.124
4.000	0.	-0.076	0.102
4.200	0.	-0.060	0.084
4.400	0.	-0.047	0.068
4.600	0.	-0.037	0.056
4.800	0.	-0.029	0.045
5.000	0.	-0.023	0.037
5.200	0.	-0.018	0.030
5.400	0.	-0.014	0.024
5.600	0.	-0.011	0.019
5.800	0.	-0.008	0.015
6.000	0.	-0.006	0.012
6.200	0.	-0.005	0.010
6.400	0.	-0.004	0.008
6.600	0.	-0.003	0.006
6.800	0.	-0.002	0.005
7.000	0.	-0.002	0.004
7.200	0.	-0.001	0.003
7.400	0.	-0.001	0.003
7.600	0.	-0.001	0.002
7.800	0.	-0.001	0.002
8.000	0.	-0.	0.001
8.200	0.	-0.	0.001
8.400	0.	-0.	0.001
8.600	0.	-0.	0.001
$\lambda$	23.8	2.31	1.81
$\langle r^{-1} \rangle$	65.0	3.70	1.10
$\langle r^{-2} \rangle$	5.67	0.961	0.885
$\langle r^{-3} \rangle$	0.268	1.48	1.47
$\langle r^{-4} \rangle$	0.097	2.59	2.69

N 4S

r	1s	2s	2p
0.001	0.035	0.008	0.
0.002	0.069	0.015	0.
0.004	0.137	0.030	0.
0.006	0.202	0.045	0.
0.008	0.266	0.059	0.001
0.010	0.328	0.072	0.001
0.015	0.474	0.104	0.002
0.020	0.611	0.134	0.004
0.025	0.738	0.162	0.006
0.030	0.855	0.188	0.008
0.035	0.963	0.211	0.011
0.040	1.064	0.233	0.014
0.050	1.241	0.270	0.021
0.060	1.390	0.301	0.029
0.070	1.513	0.325	0.038
0.080	1.615	0.344	0.048
0.090	1.697	0.358	0.059
0.100	1.761	0.367	0.071
0.120	1.845	0.372	0.096
0.140	1.880	0.364	0.123
0.160	1.878	0.345	0.151
0.180	1.848	0.317	0.180
0.200	1.797	0.282	0.210
0.220	1.731	0.242	0.240
0.240	1.654	0.197	0.270
0.260	1.570	0.149	0.299
0.280	1.482	0.099	0.329
0.300	1.393	0.048	0.357
0.350	1.172	-0.082	0.427
0.400	0.969	-0.209	0.490
0.450	0.789	-0.328	0.548
0.500	0.636	-0.436	0.599
0.550	0.508	-0.531	0.644
0.600	0.403	-0.614	0.682
0.650	0.319	-0.684	0.715
0.700	0.250	-0.742	0.741
0.750	0.198	-0.789	0.762
0.800	0.153	-0.826	0.778
0.850	0.120	-0.853	0.790
0.900	0.093	-0.872	0.797
0.950	0.072	-0.884	0.801
1.000	0.056	-0.889	0.801
1.100	0.034	-0.884	0.794
1.200	0.021	-0.862	0.778
1.300	0.013	-0.829	0.755
1.400	0.008	-0.788	0.727
1.500	0.005	-0.742	0.696
1.600	0.003	-0.694	0.663
1.700	0.002	-0.646	0.629
1.800	0.002	-0.597	0.594
1.900	0.001	-0.550	0.559
2.000	0.001	-0.505	0.525
2.100	0.001	-0.462	0.492
2.200	0.	-0.421	0.459
2.300	0.	-0.383	0.428
2.400	0.	-0.348	0.399
2.500	0.	-0.316	0.371
2.600	0.	-0.286	0.344
2.700	0.	-0.258	0.319
2.800	0.	-0.233	0.295
2.900	0.	-0.210	0.273
3.000	0.	-0.189	0.252
3.200	0.	-0.152	0.215
3.400	0.	-0.122	0.182
3.600	0.	-0.098	0.154

r	1s	2s	2p
3.800	0.	-0.078	0.130
4.000	0.	-0.063	0.110
4.200	0.	-0.050	0.092
4.400	0.	-0.039	0.077
4.600	0.	-0.031	0.065
4.800	0.	-0.025	0.054
5.000	0.	-0.020	0.045
5.200	0.	-0.015	0.038
5.400	0.	-0.012	0.031
5.600	0.	-0.010	0.026
5.800	0.	-0.008	0.022
6.000	0.	-0.006	0.018
6.200	0.	-0.005	0.015
6.400	0.	-0.004	0.012
6.600	0.	-0.003	0.010
6.800	0.	-0.002	0.009
7.000	0.	-0.002	0.007
7.200	0.	-0.001	0.006
7.400	0.	-0.001	0.005
7.600	0.	-0.001	0.004
7.800	0.	-0.001	0.003
8.000	0.	-0.001	0.003
8.200	0.	-0.	0.002
8.400	0.	-0.	0.002
8.600	0.	-0.	0.002
8.800	0.	-0.	0.001
9.000	0.	-0.	0.001
9.500	0.	-0.	0.001
$\lambda$	31.3	1.89	1.14
$\langle r^{-2} \rangle$	89.4	4.73	1.34
$\langle r^{-1} \rangle$	6.65	1.08	0.958
$\langle r \rangle$	0.228	1.33	1.41
$\langle r^2 \rangle$	0.070	2.15	2.55

r	1s	2s	2p
0.260	1.570	0.150	0.293
0.280	1.483	0.099	0.322
0.300	1.393	0.048	0.350
0.350	1.172	-0.084	0.417
0.400	0.968	-0.212	0.479
0.450	0.789	-0.331	0.535
0.500	0.636	-0.440	0.585
0.550	0.508	-0.536	0.628
0.600	0.403	-0.620	0.665
0.650	0.318	-0.690	0.696
0.700	0.250	-0.749	0.722
0.750	0.196	-0.796	0.742
0.800	0.153	-0.832	0.758
0.850	0.119	-0.859	0.769
0.900	0.093	-0.878	0.777
0.950	0.072	-0.889	0.781
1.000	0.056	-0.894	0.781
1.100	0.034	-0.887	0.776
1.200	0.021	-0.864	0.761
1.300	0.013	-0.830	0.741
1.400	0.008	-0.788	0.716
1.500	0.005	-0.741	0.689
1.600	0.003	-0.692	0.659
1.700	0.002	-0.643	0.628
1.800	0.002	-0.593	0.596
1.900	0.001	-0.546	0.565
2.000	0.001	-0.500	0.534
2.100	0.001	-0.457	0.503
2.200	0.	-0.416	0.473
2.300	0.	-0.378	0.445
2.400	0.	-0.343	0.417
2.500	0.	-0.310	0.391
2.600	0.	-0.280	0.366
2.700	0.	-0.253	0.342
2.800	0.	-0.228	0.319
2.900	0.	-0.205	0.298
3.000	0.	-0.184	0.278
3.200	0.	-0.148	0.241
3.400	0.	-0.119	0.208
3.600	0.	-0.095	0.180
3.800	0.	-0.076	0.155
4.000	0.	-0.060	0.133
4.200	0.	-0.048	0.114
4.400	0.	-0.038	0.097
4.600	0.	-0.030	0.083
4.800	0.	-0.024	0.071
5.000	0.	-0.019	0.061
5.200	0.	-0.015	0.052
5.400	0.	-0.012	0.044
5.600	0.	-0.009	0.037
5.800	0.	-0.007	0.032
6.000	0.	-0.006	0.027
6.200	0.	-0.004	0.023
6.400	0.	-0.003	0.019
6.600	0.	-0.003	0.016
6.800	0.	-0.002	0.014
7.000	0.	-0.002	0.012
7.200	0.	-0.001	0.010
7.400	0.	-0.001	0.008
7.600	0.	-0.001	0.007
7.800	0.	-0.001	0.006
8.000	0.	-0.	0.005
8.200	0.	-0.	0.004
8.400	0.	-0.	0.004
8.600	0.	-0.	0.003
8.800	0.	-0.	0.002
9.000	0.	-0.	0.002
9.500	0.	-0.	0.001
10.000	0.	-0.	0.001
10.500	0.	-0.	0.001

**N 2P**

r	1s	2s	2p
0.001	0.035	0.008	0.
0.002	0.069	0.015	0.
0.004	0.137	0.030	0.
0.006	0.202	0.045	0.
0.008	0.266	0.059	0.001
0.010	0.328	0.073	0.001
0.015	0.475	0.105	0.002
0.020	0.611	0.136	0.004
0.025	0.738	0.163	0.006
0.030	0.855	0.189	0.008
0.035	0.964	0.213	0.011
0.040	1.064	0.235	0.014
0.050	1.241	0.272	0.020
0.060	1.390	0.303	0.028
0.070	1.514	0.328	0.038
0.080	1.615	0.347	0.047
0.090	1.697	0.360	0.058
0.100	1.761	0.370	0.070
0.120	1.845	0.375	0.094
0.140	1.881	0.367	0.120
0.160	1.879	0.348	0.148
0.180	1.848	0.320	0.176
0.200	1.797	0.284	0.205
0.220	1.731	0.243	0.235
0.240	1.654	0.198	0.264

r	1s	2s	2p
$\lambda$	31.4	1.95	0.943
$\langle r^{-2} \rangle$	89.4	4.80	1.28
$\langle r^{-1} \rangle$	6.65	1.09	0.932
$\langle r \rangle$	0.228	1.32	1.47
$\langle r^2 \rangle$	0.070	2.12	2.82

r	1s	2s	2p
2.400	0.	-0.345	0.410
2.500	0.	-0.312	0.383
2.600	0.	-0.282	0.357
2.700	0.	-0.255	0.333
2.800	0.	-0.230	0.310
2.900	0.	-0.207	0.288
3.000	0.	-0.186	0.268

**N<sup>2</sup>D**

r	1s	2s	2p
0.001	0.035	0.008	0.
0.002	0.069	0.015	0.
0.004	0.137	0.030	0.
0.006	0.202	0.045	0.
0.008	0.266	0.059	0.001
0.010	0.328	0.073	0.001
0.015	0.474	0.105	0.002
0.020	0.611	0.135	0.004
0.025	0.738	0.163	0.006
0.030	0.855	0.189	0.008
0.035	0.963	0.212	0.011
0.040	1.064	0.234	0.014
0.050	1.241	0.271	0.021
0.060	1.390	0.302	0.029
0.070	1.514	0.327	0.038
0.080	1.615	0.346	0.048
0.090	1.697	0.359	0.059
0.100	1.761	0.368	0.070
0.120	1.845	0.374	0.095
0.140	1.880	0.366	0.121
0.160	1.879	0.347	0.149
0.180	1.848	0.319	0.178
0.200	1.797	0.284	0.207
0.220	1.731	0.243	0.237
0.240	1.654	0.198	0.266
0.260	1.570	0.150	0.296
0.280	1.483	0.099	0.324
0.300	1.393	0.048	0.353
0.350	1.172	-0.083	0.421
0.400	0.968	-0.211	0.484
0.450	0.789	-0.330	0.540
0.500	0.636	-0.438	0.591
0.550	0.508	-0.534	0.635
0.600	0.403	-0.617	0.672
0.650	0.318	-0.688	0.704
0.700	0.250	-0.746	0.730
0.750	0.196	-0.793	0.750
0.800	0.153	-0.830	0.766
0.850	0.119	-0.857	0.777
0.900	0.093	-0.875	0.785
0.950	0.072	-0.887	0.789
1.000	0.056	-0.892	0.789
1.100	0.034	-0.886	0.783
1.200	0.021	-0.863	0.768
1.300	0.013	-0.829	0.747
1.400	0.008	-0.788	0.721
1.500	0.005	-0.742	0.692
1.600	0.003	-0.693	0.661
1.700	0.002	-0.644	0.629
1.800	0.002	-0.595	0.596
1.900	0.001	-0.548	0.563
2.000	0.001	-0.502	0.531
2.100	0.001	-0.459	0.499
2.200	0.	-0.418	0.468
2.300	0.	-0.380	0.439

3.200	0.	-0.150	0.230
3.400	0.	-0.120	0.198
3.600	0.	-0.096	0.169
3.800	0.	-0.077	0.145
4.000	0.	-0.061	0.123
4.200	0.	-0.049	0.105
4.400	0.	-0.039	0.089
4.600	0.	-0.031	0.075
4.800	0.	-0.024	0.064
5.000	0.	-0.019	0.054
5.200	0.	-0.015	0.046
5.400	0.	-0.012	0.039
5.600	0.	-0.009	0.032
5.800	0.	-0.007	0.027
6.000	0.	-0.006	0.023
6.200	0.	-0.005	0.019
6.400	0.	-0.004	0.016
6.600	0.	-0.003	0.014
6.800	0.	-0.002	0.011
7.000	0.	-0.002	0.010
7.200	0.	-0.001	0.008
7.400	0.	-0.001	0.007
7.600	0.	-0.001	0.006
7.800	0.	-0.001	0.005
8.000	0.	-0.	0.004
8.200	0.	-0.	0.003
8.400	0.	-0.	0.003
8.600	0.	-0.	0.002
8.800	0.	-0.	0.002
9.000	0.	-0.	0.002

9.500	0.	-0.	0.001
10.000	0.	-0.	0.001
$\lambda$	31.3	1.93	1.02
$\langle r^{-2} \rangle$	89.4	4.77	1.30
$\langle r^{-1} \rangle$	6.65	1.08	0.942
$\langle r \rangle$	0.228	1.33	1.45
$\langle r^2 \rangle$	0.070	2.13	2.71

**N<sup>+</sup>1S**

r	1s	2s	2p
0.001	0.035	0.008	0.
0.002	0.069	0.016	0.
0.004	0.137	0.032	0.
0.006	0.202	0.047	0.
0.008	0.266	0.062	0.001
0.010	0.328	0.077	0.001
0.015	0.475	0.111	0.002
0.020	0.611	0.143	0.004
0.025	0.738	0.173	0.006
0.030	0.855	0.200	0.009
0.035	0.961	0.225	0.012
0.040	1.064	0.248	0.015
0.050	1.241	0.288	0.023
0.060	1.390	0.320	0.032



r	1s	2s	2p	r	1s	2s	2p
0.070	1.514	0.346	0.042	7.200	0.	—0.	0.002
0.080	1.616	0.366	0.053	7.400	0.	—0.	0.002
0.090	1.698	0.381	0.065	7.600	0.	—0.	0.001
0.100	1.762	0.390	0.078	7.800	0.	—0.	0.001
0.120	1.846	0.396	0.105	8.000	0.	—0.	0.001
0.140	1.881	0.388	0.135	8.200	0.	—0.	0.001
0.160	1.879	0.367	0.166	8.400	0.	—0.	0.001
0.180	1.849	0.337	0.198				
0.200	1.798	0.299	0.230	$\lambda$	32.7	2.98	1.85
0.220	1.731	0.256	0.263	$\langle r^{-2} \rangle$	89.5	5.32	1.50
0.240	1.654	0.207	0.295	$\langle r^{-1} \rangle$	6.66	1.15	1.02
0.260	1.571	0.156	0.327	$\langle r \rangle$	0.228	1.25	1.31
0.280	1.483	0.102	0.359	$\langle r^2 \rangle$	0.070	1.85	2.17
0.300	1.393	0.047	0.390				
0.350	1.172	—0.092	0.465				
0.400	0.968	—0.228	0.532				
0.450	0.788	—0.355	0.593				
0.500	0.635	—0.470	0.646	N <sup>+</sup> 2P			
0.550	0.507	—0.571	0.692	r	1s	2s	2p
0.600	0.402	—0.658	0.731	0.001	0.035	0.008	0.
0.650	0.317	—0.731	0.762	0.002	0.069	0.016	0.
0.700	0.249	—0.791	0.787	0.004	0.137	0.032	0.
0.750	0.195	—0.839	0.806	0.006	0.202	0.047	0.
0.800	0.152	—0.875	0.820	0.008	0.266	0.062	0.001
0.850	0.118	—0.901	0.828	0.010	0.328	0.076	0.001
0.900	0.092	—0.917	0.833	0.015	0.475	0.111	0.002
0.950	0.071	—0.926	0.833	0.020	0.611	0.142	0.004
1.000	0.055	—0.928	0.830	0.025	0.738	0.172	0.006
1.100	0.033	—0.914	0.816	0.030	0.855	0.199	0.009
1.200	0.020	—0.883	0.792	0.035	0.964	0.224	0.012
1.300	0.012	—0.840	0.762	0.040	1.064	0.246	0.016
1.400	0.007	—0.789	0.728	0.050	1.241	0.286	0.024
1.500	0.005	—0.734	0.691	0.060	1.390	0.318	0.033
1.600	0.003	—0.678	0.652	0.070	1.514	0.344	0.043
1.700	0.002	—0.621	0.613	0.080	1.616	0.364	0.055
1.800	0.001	—0.566	0.573	0.090	1.698	0.378	0.067
1.900	0.001	—0.513	0.535	0.100	1.762	0.388	0.080
2.000	0.001	—0.463	0.497	0.120	1.846	0.394	0.108
2.100	0.	—0.416	0.461	0.140	1.881	0.385	0.139
2.200	0.	—0.373	0.426	0.160	1.879	0.365	0.170
2.300	0.	—0.333	0.393	0.180	1.849	0.335	0.203
2.400	0.	—0.297	0.362	0.200	1.798	0.298	0.237
2.500	0.	—0.264	0.333	0.220	1.731	0.254	0.270
2.600	0.	—0.234	0.305	0.240	1.654	0.207	0.304
2.700	0.	—0.207	0.279	0.260	1.570	0.156	0.337
2.800	0.	—0.183	0.255	0.280	1.483	0.102	0.370
2.900	0.	—0.161	0.233	0.300	1.393	0.048	0.402
3.000	0.	—0.142	0.213	0.350	1.172	—0.091	0.479
3.200	0.	—0.109	0.176	0.400	0.968	—0.226	0.550
3.400	0.	—0.084	0.145	0.450	0.788	—0.352	0.613
3.600	0.	—0.064	0.119	0.500	0.635	—0.466	0.669
3.800	0.	—0.049	0.098	0.550	0.507	—0.566	0.716
4.000	0.	—0.037	0.080	0.600	0.402	—0.653	0.756
4.200	0.	—0.028	0.065	0.650	0.317	—0.726	0.789
4.400	0.	—0.021	0.052	0.700	0.249	—0.786	0.815
4.600	0.	—0.016	0.042	0.750	0.195	—0.834	0.835
4.800	0.	—0.012	0.034	0.800	0.152	—0.870	0.848
5.000	0.	—0.009	0.028	0.850	0.118	—0.896	0.857
5.200	0.	—0.007	0.022	0.900	0.092	—0.913	0.860
5.400	0.	—0.005	0.018	0.950	0.071	—0.923	0.860
5.600	0.	—0.004	0.014	1.000	0.055	—0.925	0.855
5.800	0.	—0.003	0.011	1.100	0.033	—0.912	0.837
6.000	0.	—0.002	0.009	1.200	0.020	—0.882	0.809
6.200	0.	—0.001	0.007	1.300	0.012	—0.840	0.774
6.400	0.	—0.001	0.006				
6.600	0.	—0.001	0.005				
6.800	0.	—0.001	0.004				
7.000	0.	—0.	0.003				

$r$	$1s$	$2s$	$2p$
1.400	0.007	-0.791	0.734
1.500	0.005	-0.736	0.691
1.600	0.003	-0.680	0.647
1.700	0.002	-0.624	0.602
1.800	0.001	-0.570	0.558
1.900	0.001	-0.517	0.514
2.000	0.001	-0.467	0.473
2.100	0.	-0.420	0.433
2.200	0.	-0.377	0.396
2.300	0.	-0.337	0.361
2.400	0.	-0.301	0.328
2.500	0.	-0.267	0.297
2.600	0.	-0.237	0.269
2.700	0.	-0.210	0.243
2.800	0.	-0.186	0.219
2.900	0.	-0.164	0.198
3.000	0.	-0.144	0.178
3.200	0.	-0.111	0.143
3.400	0.	-0.086	0.115
3.600	0.	-0.066	0.091
3.800	0.	-0.050	0.073
4.000	0.	-0.038	0.058
4.200	0.	-0.029	0.045
4.400	0.	-0.022	0.036
4.600	0.	-0.016	0.028
4.800	0.	-0.012	0.022
5.000	0.	-0.009	0.017
5.200	0.	-0.007	0.013
5.400	0.	-0.005	0.010
5.600	0.	-0.004	0.008
5.800	0.	-0.003	0.006
6.000	0.	-0.002	0.005
6.200	0.	-0.002	0.004
6.400	0.	-0.001	0.003
6.600	0.	-0.001	0.002
6.800	0.	-0.001	0.002
7.000	0.	-0.	0.001
7.200	0.	-0.	0.001
7.400	0.	-0.	0.001
7.600	0.	-0.	0.001
$\lambda$	32.6	2.93	2.22
$\langle r^{-3} \rangle$	89.5	5.26	1.58
$\langle r^{-1} \rangle$	6.66	1.14	1.06
$\langle r \rangle$	0.228	1.25	1.24
$\langle r^2 \rangle$	0.070	1.87	1.93

**N<sup>+</sup> 1D**

$r$	$1s$	$2s$	$2p$
0.001	0.035	0.008	0.
0.002	0.069	0.016	0.
0.004	0.137	0.032	0.
0.006	0.202	0.047	0.
0.008	0.266	0.062	0.001
0.010	0.328	0.077	0.001
0.015	0.475	0.111	0.002
0.020	0.611	0.143	0.004
0.025	0.738	0.172	0.006
0.030	0.855	0.199	0.009
0.035	0.964	0.224	0.012
0.040	1.064	0.247	0.015
0.050	1.241	0.286	0.023
0.060	1.390	0.319	0.033
0.070	1.514	0.345	0.043

$r$	$1s$	$2s$	$2p$
0.080	1.616	0.365	0.054
0.090	1.698	0.379	0.066
0.100	1.762	0.389	0.079
0.120	1.846	0.395	0.107
0.140	1.881	0.386	0.138
0.160	1.879	0.368	0.169
0.180	1.849	0.336	0.202
0.200	1.798	0.298	0.235
0.220	1.731	0.255	0.268
0.240	1.654	0.207	0.301
0.260	1.570	0.156	0.335
0.280	1.483	0.102	0.367
0.300	1.393	0.047	0.399
0.350	1.172	-0.091	0.475
0.400	0.968	-0.226	0.545
0.450	0.788	-0.353	0.608
0.500	0.635	-0.467	0.663
0.550	0.507	-0.568	0.710
0.600	0.402	-0.654	0.750
0.650	0.317	-0.728	0.782
0.700	0.249	-0.787	0.808
0.750	0.195	-0.835	0.827
0.800	0.152	-0.871	0.841
0.850	0.118	-0.897	0.849
0.900	0.092	-0.914	0.853
0.950	0.071	-0.924	0.853
1.000	0.055	-0.928	0.849
1.100	0.033	-0.913	0.832
1.200	0.020	-0.882	0.805
1.300	0.012	-0.840	0.771
1.400	0.007	-0.790	0.733
1.500	0.005	-0.736	0.692
1.600	0.003	-0.680	0.649
1.700	0.002	-0.624	0.605
1.800	0.001	-0.569	0.562
1.900	0.001	-0.516	0.520
2.000	0.001	-0.468	0.480
2.100	0.	-0.419	0.441
2.200	0.	-0.376	0.404
2.300	0.	-0.336	0.370
2.400	0.	-0.300	0.337
2.500	0.	-0.266	0.307
2.600	0.	-0.236	0.279
2.700	0.	-0.209	0.253
2.800	0.	-0.185	0.229
2.900	0.	-0.163	0.207
3.000	0.	-0.144	0.187
3.200	0.	-0.111	0.151
3.400	0.	-0.085	0.122
3.600	0.	-0.065	0.098
3.800	0.	-0.050	0.079
4.000	0.	-0.038	0.063
4.200	0.	-0.028	0.050
4.400	0.	-0.021	0.040
4.600	0.	-0.016	0.031
4.800	0.	-0.012	0.025
5.000	0.	-0.009	0.020
5.200	0.	-0.007	0.015
5.400	0.	-0.005	0.012
5.600	0.	-0.004	0.009
5.800	0.	-0.003	0.007
6.000	0.	-0.002	0.006
6.200	0.	-0.002	0.005
6.400	0.	-0.001	0.004
6.600	0.	-0.001	0.003
6.800	0.	-0.001	0.002
7.000	0.	-0.	0.002
7.200	0.	-0.	0.001
7.400	0.	-0.	0.001
7.600	0.	-0.	0.001
7.800	0.	-0.	0.001

r	1s	2s	2p
$\lambda$	32.6	2.94	2.12
$\langle r^{-3} \rangle$	89.5	5.28	1.58
$\langle r^{-1} \rangle$	6.66	1.14	1.05
$\langle r \rangle$	0.228	1.25	1.26
$\langle r^2 \rangle$	0.070	1.87	1.99

**N<sup>++</sup> 1P**

r	1s	2s	2p
0.001	0.035	0.009	0.
0.002	0.069	0.017	0.
0.004	0.137	0.034	0.
0.006	0.202	0.050	0.
0.008	0.266	0.066	0.001
0.010	0.328	0.081	0.001
0.015	0.475	0.118	0.003
0.020	0.612	0.151	0.005
0.025	0.739	0.183	0.007
0.030	0.856	0.211	0.010
0.035	0.965	0.238	0.014
0.040	1.065	0.262	0.018
0.050	1.242	0.304	0.027
0.060	1.391	0.339	0.037
0.070	1.515	0.368	0.049
0.080	1.617	0.387	0.061
0.090	1.699	0.402	0.075
0.100	1.763	0.412	0.090
0.120	1.847	0.419	0.122
0.140	1.883	0.409	0.156
0.160	1.880	0.387	0.191
0.180	1.850	0.355	0.228
0.200	1.799	0.314	0.265
0.220	1.732	0.268	0.303
0.240	1.655	0.216	0.341
0.260	1.571	0.162	0.378
0.280	1.483	0.104	0.414
0.300	1.393	0.046	0.450
0.350	1.172	-0.103	0.535
0.400	0.967	-0.247	0.612
0.450	0.787	-0.381	0.680
0.500	0.633	-0.503	0.739
0.550	0.505	-0.609	0.789
0.600	0.400	-0.700	0.829
0.650	0.315	-0.775	0.861
0.700	0.247	-0.836	0.885
0.750	0.193	-0.884	0.901
0.800	0.150	-0.919	0.911
0.850	0.116	-0.943	0.914
0.900	0.090	-0.957	0.912
0.950	0.070	-0.962	0.905
1.000	0.054	-0.960	0.894
1.100	0.032	-0.937	0.862
1.200	0.019	-0.896	0.820
1.300	0.011	-0.842	0.771
1.400	0.007	-0.782	0.717
1.500	0.004	-0.718	0.663
1.600	0.002	-0.653	0.608
1.700	0.002	-0.590	0.554
1.800	0.001	-0.529	0.502
1.900	0.001	-0.472	0.453
2.000	0.	-0.418	0.407
2.100	0.	-0.370	0.364
2.200	0.	-0.325	0.324

r	1s	2s	2p
2.300	0.	-0.285	0.288
2.400	0.	-0.249	0.255
2.500	0.	-0.217	0.226
2.600	0.	-0.188	0.199
2.700	0.	-0.163	0.175
2.800	0.	-0.141	0.153
2.900	0.	-0.121	0.134
3.000	0.	-0.105	0.117

3.200	0.	-0.077	0.089
3.400	0.	-0.056	0.068
3.600	0.	-0.041	0.051
3.800	0.	-0.030	0.038
4.000	0.	-0.021	0.028
4.200	0.	-0.015	0.021
4.400	0.	-0.011	0.016
4.600	0.	-0.008	0.011
4.800	0.	-0.006	0.008
5.000	0.	-0.004	0.006
5.200	0.	-0.003	0.005
5.400	0.	-0.002	0.003
5.600	0.	-0.001	0.002
5.800	0.	-0.001	0.002
6.000	0.	-0.001	0.001
6.200	0.	0.	0.001
6.400	0.	0.	0.001

r	1s	2s	2p
$\lambda$	34.2	4.14	3.51
$\langle r^{-3} \rangle$	89.6	5.90	1.84
$\langle r^{-1} \rangle$	6.66	1.21	1.15
$\langle r \rangle$	0.228	1.18	1.12
$\langle r^2 \rangle$	0.070	1.64	1.54

**O 1S**

r	1s	2s	2p
0.001	0.043	0.010	0.
0.002	0.085	0.019	0.
0.004	0.167	0.038	0.
0.006	0.247	0.056	0.001
0.008	0.324	0.074	0.001
0.010	0.398	0.091	0.001
0.015	0.574	0.131	0.003
0.020	0.736	0.167	0.005
0.025	0.884	0.201	0.008
0.030	1.019	0.231	0.012
0.035	1.143	0.259	0.015
0.040	1.256	0.284	0.020
0.050	1.450	0.325	0.030
0.060	1.609	0.358	0.041
0.070	1.735	0.382	0.054
0.080	1.833	0.399	0.068
0.090	1.908	0.409	0.083
0.100	1.961	0.413	0.099
0.120	2.015	0.405	0.133
0.140	2.014	0.381	0.168
0.160	1.974	0.344	0.205
0.180	1.905	0.297	0.243
0.200	1.817	0.242	0.280
0.220	1.717	0.182	0.318
0.240	1.610	0.119	0.355
0.260	1.500	0.053	0.390
0.280	1.389	-0.013	0.425
0.300	1.281	-0.080	0.459

r	1s	2s	2p
0.350	1.028	-0.242	0.537
0.400	0.811	-0.391	0.606
0.450	0.630	-0.523	0.664
0.500	0.485	-0.636	0.713
0.550	0.371	-0.730	0.753
0.600	0.281	-0.806	0.785
0.650	0.213	-0.864	0.808
0.700	0.160	-0.908	0.825
0.750	0.120	-0.938	0.836
0.800	0.090	-0.956	0.841
0.850	0.068	-0.964	0.842
0.900	0.051	-0.964	0.839
0.950	0.038	-0.956	0.833
1.000	0.029	-0.943	0.823
1.100	0.016	-0.903	0.798
1.200	0.010	-0.851	0.767
1.300	0.006	-0.792	0.731
1.400	0.004	-0.730	0.693
1.500	0.002	-0.668	0.655
1.600	0.002	-0.607	0.615
1.700	0.001	-0.549	0.577
1.800	0.001	-0.494	0.539
1.900	0.001	-0.443	0.503
2.000	0.	-0.397	0.469
2.100	0.	-0.354	0.436
2.200	0.	-0.315	0.404
2.300	0.	-0.280	0.375
2.400	0.	-0.248	0.347
2.500	0.	-0.219	0.321
2.600	0.	-0.194	0.297
2.700	0.	-0.171	0.274
2.800	0.	-0.151	0.253
2.900	0.	-0.133	0.233
3.000	0.	-0.117	0.215
3.200	0.	-0.090	0.182
3.400	0.	-0.070	0.154
3.600	0.	-0.053	0.130
3.800	0.	-0.041	0.109
4.000	0.	-0.031	0.092
4.200	0.	-0.024	0.077
4.400	0.	-0.018	0.065
4.600	0.	-0.014	0.054
4.800	0.	-0.011	0.045
5.000	0.	-0.008	0.038
5.200	0.	-0.006	0.032
5.400	0.	-0.005	0.026
5.600	0.	-0.004	0.022
5.800	0.	-0.003	0.018
6.000	0.	-0.002	0.015
6.200	0.	-0.002	0.013
6.400	0.	-0.001	0.011
6.600	0.	-0.001	0.009
6.800	0.	-0.001	0.007
7.000	0.	-0.001	0.006
7.200	0.	-0.	0.005
7.400	0.	-0.	0.004
7.600	0.	-0.	0.003
7.800	0.	-0.	0.003
8.000	0.	-0.	0.002
8.200	0.	-0.	0.002
8.400	0.	-0.	0.002
8.600	0.	-0.	0.001
8.800	0.	-0.	0.001
9.000	0.	-0.	0.001
9.500	0.	-0.	0.001
$\lambda$	41.5	2.55	1.11
$\langle r^{-2} \rangle$	118.	6.63	1.77
$\langle r^{-1} \rangle$	7.64	1.27	1.09
$\langle r \rangle$	0.199	1.14	1.27
$\langle r^2 \rangle$	0.053	1.56	2.11

O 3P			
r	1s	2s	2p
0.001	0.043	0.010	0.
0.002	0.085	0.019	0.
0.004	0.167	0.038	0.
0.006	0.247	0.056	0.001
0.008	0.324	0.073	0.001
0.010	0.398	0.090	0.001
0.015	0.574	0.130	0.003
0.020	0.736	0.166	0.005
0.025	0.884	0.200	0.008
0.030	1.019	0.230	0.012
0.035	1.143	0.257	0.016
0.040	1.256	0.282	0.020
0.050	1.450	0.323	0.030
0.060	1.608	0.356	0.042
0.070	1.735	0.380	0.055
0.080	1.833	0.396	0.069
0.090	1.907	0.406	0.084
0.100	1.961	0.410	0.100
0.120	2.015	0.403	0.134
0.140	2.014	0.379	0.170
0.160	1.974	0.342	0.208
0.180	1.905	0.295	0.246
0.200	1.817	0.241	0.284
0.220	1.717	0.182	0.322
0.240	1.610	0.119	0.359
0.260	1.500	0.053	0.395
0.280	1.389	-0.013	0.431
0.300	1.281	-0.079	0.465
0.350	1.029	-0.240	0.514
0.400	0.811	-0.388	0.614
0.450	0.631	-0.519	0.674
0.500	0.486	-0.632	0.724
0.550	0.371	-0.725	0.765
0.600	0.282	-0.801	0.797
0.650	0.213	-0.860	0.821
0.700	0.160	-0.903	0.838
0.750	0.120	-0.933	0.849
0.800	0.090	-0.952	0.855
0.850	0.068	-0.961	0.855
0.900	0.051	-0.961	0.852
0.950	0.038	-0.954	0.845
1.000	0.029	-0.941	0.835
1.100	0.016	-0.902	0.808
1.200	0.010	-0.851	0.775
1.300	0.006	-0.793	0.737
1.400	0.004	-0.732	0.697
1.500	0.002	-0.670	0.655
1.600	0.002	-0.610	0.614
1.700	0.001	-0.553	0.573
1.800	0.001	-0.498	0.533
1.900	0.001	-0.448	0.495
2.000	0.	-0.401	0.458
2.100	0.	-0.358	0.424
2.200	0.	-0.319	0.391
2.300	0.	-0.284	0.361
2.400	0.	-0.252	0.332
2.500	0.	-0.223	0.305
2.600	0.	-0.197	0.280
2.700	0.	-0.174	0.257
2.800	0.	-0.154	0.236
2.900	0.	-0.136	0.216
3.000	0.	-0.120	0.198
3.200	0.	-0.092	0.165
3.400	0.	-0.071	0.138
3.600	0.	-0.055	0.114
3.800	0.	-0.042	0.095
4.000	0.	-0.032	0.079
4.200	0.	-0.025	0.065

r	1s	2s	2p	r	1s	2s	2p
4.400	0.	-0.019	0.054	0.550	0.371	-0.727	0.760
4.600	0.	-0.014	0.044	0.600	0.282	-0.803	0.792
4.800	0.	-0.011	0.037	0.650	0.213	-0.861	0.816
5.000	0.	-0.008	0.030	0.700	0.160	-0.905	0.833
5.200	0.	-0.006	0.025	0.750	0.120	-0.935	0.844
5.400	0.	-0.005	0.020	0.800	0.090	-0.954	0.849
5.600	0.	-0.004	0.017	0.850	0.068	-0.962	0.850
5.800	0.	-0.003	0.014	0.900	0.051	-0.962	0.847
6.000	0.	-0.002	0.011	0.950	0.038	-0.955	0.840
6.200	0.	-0.002	0.009	1.000	0.029	-0.942	0.830
6.400	0.	-0.001	0.008				
6.600	0.	-0.001	0.006	1.100	0.016	-0.902	0.804
6.800	0.	-0.001	0.005	1.200	0.010	-0.851	0.772
7.000	0.	-0.001	0.004	1.300	0.006	-0.792	0.735
7.200	0.	-0.	0.003	1.400	0.004	-0.731	0.696
7.400	0.	-0.	0.003	1.500	0.002	-0.669	0.655
7.600	0.	-0.	0.002	1.600	0.002	-0.609	0.615
7.800	0.	-0.	0.002	1.700	0.001	-0.551	0.575
8.000	0.	-0.	0.001	1.800	0.001	-0.497	0.536
8.200	0.	-0.	0.001	1.900	0.001	-0.446	0.498
8.400	0.	-0.	0.001	2.000	0.	-0.399	0.463
8.600	0.	-0.	0.001	2.100	0.	-0.356	0.429
8.800	0.	-0.	0.001	2.200	0.	-0.317	0.397
9.000	0.	-0.	0.001	2.300	0.	-0.282	0.366
				2.400	0.	-0.250	0.338
$\lambda$	41.3	2.49	1.26	2.500	0.	-0.222	0.312
$\langle r^{-2} \rangle$	118.	6.56	1.82	2.600	0.	-0.196	0.287
$\langle r^{-1} \rangle$	7.64	1.27	1.11	2.700	0.	-0.173	0.264
$\langle r \rangle$	0.199	1.14	1.23	2.800	0.	-0.153	0.243
$\langle r^2 \rangle$	0.053	1.58	1.97	2.900	0.	-0.135	0.223
				3.000	0.	-0.119	0.204
				3.200	0.	-0.092	0.172
				3.400	0.	-0.071	0.144
				3.600	0.	-0.054	0.121
				3.800	0.	-0.042	0.101
				4.000	0.	-0.032	0.084
				4.200	0.	-0.024	0.070
				4.400	0.	-0.019	0.058
				4.600	0.	-0.014	0.048
				4.800	0.	-0.011	0.040
				5.000	0.	-0.008	0.033
				5.200	0.	-0.006	0.027
				5.400	0.	-0.005	0.023
				5.600	0.	-0.004	0.019
				5.800	0.	-0.003	0.015
				6.000	0.	-0.002	0.013
				6.200	0.	-0.002	0.010
				6.400	0.	-0.001	0.009
				6.600	0.	-0.001	0.007
				6.800	0.	-0.001	0.006
				7.000	0.	-0.001	0.005
				7.200	0.	-0.	0.004
				7.400	0.	-0.	0.003
				7.600	0.	-0.	0.003
				7.800	0.	-0.	0.002
				8.000	0.	-0.	0.002
				8.200	0.	-0.	0.001
				8.400	0.	-0.	0.001
				8.600	0.	-0.	0.001
				8.800	0.	-0.	0.001
				9.000	0.	-0.	0.001
				$\lambda$	41.4	2.51	1.20
				$\langle r^{-2} \rangle$	118.	6.59	1.80
				$\langle r^{-1} \rangle$	7.64	1.27	1.10
				$\langle r \rangle$	0.199	1.14	1.25
				$\langle r^2 \rangle$	0.053	1.57	2.03

**0 1D**

r	1s	2s	2p
0.001	0.043	0.010	0.
0.002	0.085	0.019	0.
0.004	0.167	0.038	0.
0.006	0.247	0.056	0.001
0.008	0.324	0.074	0.001
0.010	0.398	0.091	0.001
0.015	0.574	0.130	0.003
0.020	0.736	0.167	0.005
0.025	0.884	0.200	0.008
0.030	1.019	0.230	0.012
0.035	1.143	0.258	0.016
0.040	1.256	0.283	0.020
0.050	1.450	0.324	0.030
0.060	1.609	0.357	0.042
0.070	1.735	0.381	0.054
0.080	1.833	0.397	0.069
0.090	1.908	0.407	0.084
0.100	1.961	0.411	0.100
0.120	2.015	0.404	0.134
0.140	2.014	0.380	0.169
0.160	1.974	0.343	0.207
0.180	1.905	0.296	0.244
0.200	1.817	0.242	0.282
0.220	1.717	0.182	0.320
0.240	1.610	0.119	0.357
0.260	1.500	0.053	0.393
0.280	1.389	-0.013	0.429
0.300	1.281	-0.079	0.462
0.350	1.029	-0.241	0.541
0.400	0.811	-0.389	0.611
0.450	0.631	-0.521	0.670
0.500	0.485	-0.633	0.720

**O<sup>+</sup> 4S**

r	1s	2s	2p
0.001	0.043	0.010	0.
0.002	0.085	0.020	0.
0.004	0.167	0.040	0.
0.006	0.247	0.058	0.001
0.008	0.324	0.077	0.001
0.010	0.398	0.094	0.002
0.015	0.574	0.136	0.003
0.020	0.736	0.174	0.006
0.025	0.884	0.208	0.009
0.030	1.020	0.240	0.013
0.035	1.143	0.268	0.017
0.040	1.256	0.294	0.022
0.050	1.451	0.337	0.034
0.060	1.609	0.371	0.047
0.070	1.735	0.396	0.061
0.080	1.834	0.413	0.077
0.090	1.908	0.424	0.094
0.100	1.961	0.428	0.112
0.120	2.015	0.420	0.150
0.140	2.014	0.395	0.190
0.160	1.974	0.356	0.232
0.180	1.905	0.307	0.274
0.200	1.818	0.250	0.316
0.220	1.717	0.188	0.359
0.240	1.610	0.122	0.400
0.260	1.500	0.053	0.441
0.280	1.389	-0.016	0.480
0.300	1.281	-0.085	0.518
0.350	1.028	-0.253	0.605
0.400	0.810	-0.408	0.682
0.450	0.630	-0.544	0.747
0.500	0.485	-0.661	0.800
0.550	0.370	-0.758	0.843
0.600	0.281	-0.835	0.876
0.650	0.212	-0.895	0.899
0.700	0.160	-0.938	0.914
0.750	0.120	-0.967	0.921
0.800	0.090	-0.984	0.922
0.850	0.067	-0.990	0.918
0.900	0.050	-0.987	0.909
0.950	0.038	-0.977	0.895
1.000	0.028	-0.961	0.879
1.100	0.016	-0.914	0.838
1.200	0.009	-0.855	0.789
1.300	0.005	-0.789	0.737
1.400	0.003	-0.720	0.682
1.500	0.002	-0.652	0.628
1.600	0.001	-0.586	0.574
1.700	0.001	-0.524	0.523
1.800	0.001	-0.460	0.474
1.900	0.	-0.412	0.429
2.000	0.	-0.363	0.386
2.100	0.	-0.319	0.347
2.200	0.	-0.279	0.310
2.300	0.	-0.244	0.277
2.400	0.	-0.212	0.247
2.500	0.	-0.185	0.220
2.600	0.	-0.160	0.195
2.700	0.	-0.139	0.173
2.800	0.	-0.120	0.153
2.900	0.	-0.103	0.136
3.000	0.	-0.089	0.120
3.200	0.	-0.066	0.093
3.400	0.	-0.048	0.072
3.600	0.	-0.035	0.055

r	1s	2s	2p
3.800	0.	-0.026	0.043
4.000	0.	-0.019	0.033
4.200	0.	-0.014	0.025
4.400	0.	-0.010	0.019
4.600	0.	-0.007	0.014
4.800	0.	-0.005	0.011
5.000	0.	-0.004	0.008
5.200	0.	-0.003	0.006
5.400	0.	-0.002	0.005
5.600	0.	-0.001	0.004
5.800	0.	-0.001	0.003
6.000	0.	-0.001	0.002
6.200	0.	-0.	0.001
6.400	0.	-0.	0.001
6.600	0.	-0.	0.001
6.800	0.	-0.	0.001
λ	42.7	3.60	2.65
$\langle r^{-1} \rangle$	118.	7.09	2.14
$\langle r^{-2} \rangle$	7.64	1.32	1.23
$\langle r \rangle$	0.198	1.09	1.08
$\langle r^2 \rangle$	0.053	1.42	1.46

**O<sup>+</sup> 3P**

r	1s	2s	2p
0.001	0.043	0.010	0.
0.002	0.085	0.020	0.
0.004	0.167	0.040	0.
0.006	0.247	0.059	0.001
0.008	0.324	0.077	0.001
0.010	0.398	0.095	0.002
0.015	0.574	0.136	0.003
0.020	0.736	0.174	0.006
0.025	0.884	0.209	0.009
0.030	1.020	0.241	0.013
0.035	1.143	0.270	0.017
0.040	1.256	0.295	0.022
0.050	1.451	0.339	0.033
0.060	1.609	0.373	0.046
0.070	1.735	0.398	0.060
0.080	1.834	0.415	0.076
0.090	1.908	0.426	0.093
0.100	1.961	0.430	0.110
0.120	2.015	0.422	0.148
0.140	2.014	0.396	0.187
0.160	1.974	0.357	0.228
0.180	1.905	0.308	0.270
0.200	1.818	0.251	0.312
0.220	1.717	0.188	0.353
0.240	1.610	0.122	0.394
0.260	1.500	0.053	0.434
0.280	1.389	-0.016	0.472
0.300	1.281	-0.086	0.509
0.350	1.028	-0.255	0.595
0.400	0.810	-0.410	0.670
0.450	0.630	-0.548	0.733
0.500	0.485	-0.665	0.786
0.550	0.370	-0.762	0.827
0.600	0.281	-0.839	0.859
0.650	0.212	-0.899	0.882
0.700	0.160	-0.942	0.897
0.750	0.120	-0.971	0.904
0.800	0.090	-0.987	0.906
0.850	0.067	-0.993	0.903

$r$	$1s$	$2s$	$2p$	$r$	$1s$	$2s$	$2p$
0.900	0.050	-0.990	0.894	0.050	1.451	0.338	0.033
0.950	0.037	-0.979	0.883	0.060	1.609	0.372	0.046
1.000	0.028	-0.962	0.867	0.070	1.735	0.397	0.061
				0.080	1.834	0.414	0.076
1.100	0.016	-0.914	0.830	0.090	1.908	0.425	0.093
1.200	0.009	-0.854	0.785	0.100	1.961	0.429	0.111
1.300	0.005	-0.787	0.737				
1.400	0.003	-0.718	0.686	0.120	2.015	0.421	0.148
1.500	0.002	-0.650	0.635	0.140	2.014	0.396	0.188
1.600	0.001	-0.583	0.585	0.160	1.974	0.357	0.230
1.700	0.001	-0.521	0.537	0.180	1.905	0.308	0.272
1.800	0.001	-0.462	0.490	0.200	1.818	0.251	0.314
1.900	0.	-0.409	0.447	0.220	1.717	0.188	0.355
2.000	0.	-0.360	0.406	0.240	1.610	0.122	0.396
2.100	0.	-0.316	0.367	0.260	1.500	0.053	0.436
2.200	0.	-0.276	0.332	0.280	1.389	-0.016	0.475
2.300	0.	-0.241	0.299	0.300	1.281	-0.086	0.513
2.400	0.	-0.210	0.269				
2.500	0.	-0.182	0.242	0.350	1.028	-0.254	0.599
2.600	0.	-0.158	0.216	0.400	0.810	-0.409	0.675
2.700	0.	-0.136	0.194	0.450	0.630	-0.546	0.739
2.800	0.	-0.118	0.173	0.500	0.485	-0.663	0.791
2.900	0.	-0.102	0.155	0.550	0.370	-0.760	0.834
3.000	0.	-0.087	0.138	0.600	0.281	-0.838	0.866
				0.650	0.212	-0.897	0.889
3.200	0.	-0.065	0.109	0.700	0.159	-0.940	0.903
3.400	0.	-0.047	0.086	0.750	0.120	-0.969	0.911
3.600	0.	-0.035	0.068	0.800	0.090	-0.986	0.913
3.800	0.	-0.025	0.053	0.850	0.067	-0.992	0.909
4.000	0.	-0.018	0.041	0.900	0.050	-0.989	0.900
4.200	0.	-0.013	0.032	0.950	0.038	-0.978	0.888
4.400	0.	-0.010	0.025	1.000	0.028	-0.961	0.872
4.600	0.	-0.007	0.019				
4.800	0.	-0.005	0.015	1.100	0.016	-0.914	0.833
5.000	0.	-0.004	0.011	1.200	0.009	-0.854	0.787
5.200	0.	-0.003	0.009	1.300	0.005	-0.788	0.737
5.400	0.	-0.002	0.007	1.400	0.003	-0.719	0.685
5.600	0.	-0.001	0.005	1.500	0.002	-0.651	0.633
5.800	0.	-0.001	0.004	1.600	0.001	-0.585	0.581
6.000	0.	-0.001	0.003	1.700	0.001	-0.522	0.532
6.200	0.	0.	0.002	1.800	0.001	-0.464	0.484
6.400	0.	0.	0.002	1.900	0.	-0.410	0.440
6.600	0.	0.	0.001	2.000	0.	-0.361	0.398
6.800	0.	0.	0.001	2.100	0.	-0.317	0.359
7.000	0.	0.	0.001	2.200	0.	-0.277	0.323
7.200	0.	0.	0.001	2.300	0.	-0.242	0.290
				2.400	0.	-0.211	0.260
$\lambda$	42.8	3.65	2.38	2.500	0.	-0.183	0.233
$\langle r^{-2} \rangle$	118.	7.15	2.08	2.600	0.	-0.159	0.208
$\langle r^{-1} \rangle$	7.64	1.33	1.20	2.700	0.	-0.137	0.185
$\langle r \rangle$	0.198	1.09	1.11	2.800	0.	-0.119	0.165
$\langle r^2 \rangle$	0.053	1.41	1.56	2.900	0.	-0.102	0.147
				3.000	0.	-0.088	0.130
				3.200	0.	-0.065	0.102
				3.400	0.	-0.048	0.080
				3.600	0.	-0.035	0.062
				3.800	0.	-0.026	0.049
				4.000	0.	-0.019	0.038
				4.200	0.	-0.013	0.029
				4.400	0.	-0.010	0.022
				4.600	0.	-0.007	0.017
				4.800	0.	-0.005	0.013
				5.000	0.	-0.004	0.010
				5.200	0.	-0.003	0.008
				5.400	0.	-0.002	0.006
				5.600	0.	-0.001	0.004
				5.800	0.	-0.001	0.003
				6.000	0.	-0.001	0.003
				6.200	0.	0.	0.002
				6.400	0.	0.	0.001
				6.600	0.	0.	0.001
				6.800	0.	0.	0.001
				7.000	0.	0.	0.001

$O^+ \text{ } ^2D$			
$r$	$1s$	$2s$	$2p$
0.001	0.043	0.010	0.
0.002	0.085	0.020	0.
0.004	0.167	0.040	0.
0.006	0.247	0.059	0.001
0.008	0.324	0.077	0.001
0.010	0.398	0.094	0.002
0.015	0.574	0.136	0.003
0.020	0.736	0.174	0.006
0.025	0.884	0.209	0.009
0.030	1.020	0.240	0.013
0.035	1.143	0.269	0.017
0.040	1.256	0.295	0.022

r	1s	2s	2p
$\lambda$	42.8	3.63	2.49
$\langle r^{-2} \rangle$	118.	7.13	2.10
$\langle r^{-1} \rangle$	7.64	1.32	1.21
$\langle r \rangle$	0.198	1.09	1.10
$\langle r^2 \rangle$	0.053	1.41	1.52

**$0^{++} 1S$**

r	1s	2s	2p
0.001	0.043	0.011	0.
0.002	0.085	0.021	0.
0.004	0.167	0.042	0.
0.006	0.247	0.062	0.001
0.008	0.324	0.081	0.001
0.010	0.399	0.100	0.002
0.015	0.575	0.143	0.004
0.020	0.736	0.184	0.007
0.025	0.885	0.220	0.010
0.030	1.020	0.253	0.014
0.035	1.144	0.284	0.019
0.040	1.257	0.311	0.024
0.050	1.452	0.357	0.036
0.060	1.610	0.392	0.050
0.070	1.737	0.419	0.066
0.080	1.835	0.437	0.083
0.090	1.909	0.447	0.101
0.100	1.962	0.452	0.121
0.120	2.016	0.443	0.162
0.140	2.016	0.416	0.205
0.160	1.975	0.374	0.250
0.180	1.906	0.322	0.295
0.200	1.818	0.261	0.340
0.220	1.718	0.195	0.385
0.240	1.610	0.124	0.430
0.260	1.500	0.052	0.472
0.280	1.389	-0.022	0.514
0.300	1.280	-0.096	0.554
0.350	1.027	-0.274	0.645
0.400	0.809	-0.438	0.724
0.450	0.628	-0.582	0.790
0.500	0.483	-0.704	0.843
0.550	0.368	-0.804	0.884
0.600	0.279	-0.883	0.914
0.650	0.210	-0.943	0.934
0.700	0.157	-0.985	0.946
0.750	0.118	-1.011	0.949
0.800	0.088	-1.024	0.946
0.850	0.066	-1.026	0.937
0.900	0.049	-1.018	0.923
0.950	0.036	-1.002	0.906
1.000	0.027	-0.979	0.885
1.100	0.015	-0.920	0.836
1.200	0.008	-0.849	0.780
1.300	0.005	-0.772	0.721
1.400	0.003	-0.694	0.662
1.500	0.002	-0.618	0.603
1.600	0.001	-0.546	0.546
1.700	0.001	-0.479	0.492
1.800	0.	-0.418	0.441
1.900	0.	-0.363	0.394
2.000	0.	-0.313	0.351
2.100	0.	-0.269	0.311
2.200	0.	-0.231	0.275
2.300	0.	-0.197	0.243

r	1s	2s	2p
2.400	0.	-0.168	0.214
2.500	0.	-0.143	0.188
2.600	0.	-0.121	0.164
2.700	0.	-0.102	0.144
2.800	0.	-0.086	0.125
2.900	0.	-0.072	0.109
3.000	0.	-0.061	0.095

3.200	0.	-0.043	0.072
3.400	0.	-0.030	0.054
3.600	0.	-0.021	0.040
3.800	0.	-0.014	0.030
4.000	0.	-0.010	0.022
4.200	0.	-0.007	0.016
4.400	0.	-0.005	0.012
4.600	0.	-0.003	0.009
4.800	0.	-0.002	0.006
5.000	0.	-0.001	0.005
5.200	0.	-0.001	0.003
5.400	0.	-0.001	0.002
5.600	0.	0.	0.002
5.800	0.	0.	0.001
6.000	0.	0.	0.001
6.200	0.	0.	0.001

r	1s	2s	2p
$\lambda$	44.6	5.01	3.61
$\langle r^{-2} \rangle$	118.	7.86	2.34
$\langle r^{-1} \rangle$	7.65	1.39	1.29
$\langle r \rangle$	0.198	1.03	1.02
$\langle r^2 \rangle$	0.053	1.26	1.30

**$0^{++} 3P$**

r	1s	2s	2p
0.001	0.043	0.011	0.
0.002	0.085	0.021	0.
0.004	0.167	0.042	0.
0.006	0.247	0.061	0.001
0.008	0.324	0.081	0.001
0.010	0.399	0.099	0.002
0.015	0.575	0.143	0.004
0.020	0.736	0.183	0.007
0.025	0.885	0.219	0.010
0.030	1.020	0.253	0.014
0.035	1.144	0.283	0.019
0.040	1.257	0.310	0.025
0.050	1.452	0.355	0.037
0.060	1.610	0.391	0.051
0.070	1.736	0.417	0.067
0.080	1.835	0.435	0.085
0.090	1.909	0.446	0.103
0.100	1.962	0.450	0.123
0.120	2.016	0.442	0.165
0.140	2.016	0.415	0.209
0.160	1.975	0.373	0.255
0.180	1.906	0.321	0.301
0.200	1.818	0.261	0.348
0.220	1.718	0.195	0.394
0.240	1.610	0.125	0.439
0.260	1.500	0.052	0.483
0.280	1.389	-0.021	0.526
0.300	1.280	-0.095	0.567
0.350	1.027	-0.272	0.662
0.400	0.809	-0.436	0.743
0.450	0.628	-0.579	0.811



r	1s	2s	2p
0.500	0.483	-0.701	0.866
0.550	0.308	-0.801	0.908
0.600	0.279	-0.880	0.939
0.650	0.210	-0.940	0.959
0.700	0.158	-0.982	0.970
0.750	0.118	-1.008	0.972
0.800	0.088	-1.022	0.967
0.850	0.066	-1.024	0.957
0.900	0.049	-1.016	0.940
0.950	0.036	-1.001	0.920
1.000	0.027	-0.979	0.896
1.100	0.015	-0.921	0.840
1.200	0.009	-0.850	0.778
1.300	0.005	-0.774	0.713
1.400	0.003	-0.697	0.648
1.500	0.002	-0.621	0.584
1.600	0.001	-0.549	0.523
1.700	0.001	-0.482	0.466
1.800	0.	-0.421	0.413
1.900	0.	-0.365	0.364
2.000	0.	-0.316	0.320
2.100	0.	-0.272	0.280
2.200	0.	-0.233	0.245
2.300	0.	-0.199	0.213
2.400	0.	-0.170	0.185
2.500	0.	-0.144	0.160
2.600	0.	-0.122	0.138
2.700	0.	-0.103	0.119
2.800	0.	-0.087	0.103
2.900	0.	-0.073	0.088
3.000	0.	-0.062	0.076
3.200	0.	-0.043	0.055
3.400	0.	-0.030	0.040
3.600	0.	-0.021	0.029
3.800	0.	-0.015	0.021
4.000	0.	-0.010	0.015
4.200	0.	-0.007	0.011
4.400	0.	-0.005	0.008
4.600	0.	-0.003	0.005
4.800	0.	-0.002	0.004
5.000	0.	-0.001	0.003
5.200	0.	-0.001	0.002
5.400	0.	-0.001	0.001
5.600	0.	-0.	0.001
5.800	0.	-0.	0.001
$\lambda$	44.5	4.96	4.09
$\langle r^{-2} \rangle$	118.	7.80	2.43
$\langle r^{-1} \rangle$	7.65	1.39	1.32
$\langle r \rangle$	0.198	1.03	0.984
$\langle r^2 \rangle$	0.053	1.27	1.20

**O<sup>++</sup> D**

r	1s	2s	2p
0.001	0.043	0.011	0.
0.002	0.085	0.021	0.
0.004	0.167	0.042	0.
0.006	0.247	0.062	0.001
0.008	0.324	0.081	0.001
0.010	0.399	0.099	0.002
0.015	0.575	0.143	0.004
0.020	0.736	0.183	0.007
0.025	0.885	0.220	0.010
0.030	1.020	0.253	0.014

r	1s	2s	2p
0.035	1.144	0.283	0.019
0.040	1.257	0.310	0.025
0.050	1.452	0.356	0.037
0.060	1.610	0.391	0.051
0.070	1.738	0.417	0.067
0.080	1.835	0.436	0.084
0.090	1.909	0.446	0.103
0.100	1.962	0.450	0.122
0.120	2.016	0.442	0.164
0.140	2.015	0.415	0.208
0.160	1.975	0.374	0.254
0.180	1.906	0.321	0.300
0.200	1.818	0.261	0.346
0.220	1.718	0.195	0.392
0.240	1.610	0.124	0.437
0.260	1.500	0.052	0.481
0.280	1.389	-0.021	0.523
0.300	1.280	-0.095	0.564
0.350	1.027	-0.273	0.657
0.400	0.809	-0.436	0.738
0.450	0.628	-0.580	0.806
0.500	0.483	-0.702	0.860
0.550	0.368	-0.802	0.902
0.600	0.279	-0.881	0.932
0.650	0.210	-0.940	0.953
0.700	0.158	-0.983	0.963
0.750	0.118	-1.009	0.966
0.800	0.088	-1.022	0.962
0.850	0.066	-1.024	0.951
0.900	0.049	-1.017	0.936
0.950	0.036	-1.001	0.916
1.000	0.027	-0.979	0.893
1.100	0.015	-0.921	0.839
1.200	0.009	-0.850	0.779
1.300	0.005	-0.774	0.716
1.400	0.003	-0.696	0.652
1.500	0.002	-0.620	0.589
1.600	0.001	-0.548	0.530
1.700	0.001	-0.481	0.473
1.800	0.	-0.420	0.421
1.900	0.	-0.365	0.372
2.000	0.	-0.315	0.328
2.100	0.	-0.271	0.289
2.200	0.	-0.232	0.253
2.300	0.	-0.199	0.221
2.400	0.	-0.169	0.192
2.500	0.	-0.144	0.167
2.600	0.	-0.122	0.145
2.700	0.	-0.103	0.125
2.800	0.	-0.087	0.108
2.900	0.	-0.073	0.093
3.000	0.	-0.062	0.080
3.200	0.	-0.043	0.059
3.400	0.	-0.030	0.043
3.600	0.	-0.021	0.032
3.800	0.	-0.015	0.023
4.000	0.	-0.010	0.017
4.200	0.	-0.007	0.012
4.400	0.	-0.005	0.009
4.600	0.	-0.003	0.006
4.800	0.	-0.002	0.004
5.000	0.	-0.001	0.003
5.200	0.	-0.001	0.002
5.400	0.	-0.001	0.002
5.600	0.	-0.	0.001
5.800	0.	-0.	0.001
6.000	0.	-0.	0.001
$\lambda$	44.5	4.97	3.96

r	1s	2s	2p
$\langle r^{-2} \rangle$	118.	7.82	2.41
$\langle r^{-1} \rangle$	7.65	1.39	1.31
$\langle r \rangle$	0.198	1.03	0.994
$\langle r^2 \rangle$	0.053	1.27	1.23

**F 3P**

r	1s	2s	2p
0.001	0.051	0.012	0.
0.002	0.102	0.023	0.
0.004	0.199	0.046	0.
0.006	0.294	0.068	0.001
0.008	0.385	0.089	0.001
0.010	0.473	0.109	0.002
0.015	0.678	0.157	0.004
0.020	0.864	0.199	0.008
0.025	1.033	0.238	0.012
0.030	1.185	0.272	0.016
0.035	1.323	0.303	0.022
0.040	1.446	0.330	0.028
0.050	1.654	0.374	0.041
0.060	1.816	0.407	0.057
0.070	1.940	0.428	0.074
0.080	2.030	0.441	0.093
0.090	2.092	0.445	0.113
0.100	2.129	0.442	0.134
0.120	2.146	0.418	0.179
0.140	2.104	0.374	0.225
0.160	2.023	0.317	0.272
0.180	1.915	0.249	0.319
0.200	1.793	0.175	0.365
0.220	1.662	0.097	0.411
0.240	1.529	0.016	0.455
0.260	1.397	-0.065	0.497
0.280	1.270	-0.146	0.538
0.300	1.149	-0.224	0.576
0.350	0.881	-0.408	0.662
0.400	0.663	-0.568	0.733
0.450	0.493	-0.702	0.791
0.500	0.363	-0.809	0.836
0.550	0.265	-0.892	0.869
0.600	0.193	-0.952	0.892
0.650	0.140	-0.993	0.905
0.700	0.101	-1.017	0.911
0.750	0.073	-1.027	0.911
0.800	0.053	-1.025	0.905
0.850	0.038	-1.014	0.894
0.900	0.028	-0.995	0.880
0.950	0.020	-0.971	0.863
1.000	0.015	-0.942	0.843
1.100	0.008	-0.875	0.800
1.200	0.005	-0.801	0.752
1.300	0.003	-0.726	0.702
1.400	0.002	-0.653	0.652
1.500	0.001	-0.583	0.604
1.600	0.001	-0.518	0.557
1.700	0.001	-0.458	0.512
1.800	0.001	-0.403	0.470
1.900	0.	-0.354	0.430
2.000	0.	-0.310	0.393
2.100	0.	-0.271	0.359
2.200	0.	-0.236	0.327
2.300	0.	-0.206	0.298
2.400	0.	-0.179	0.271
2.500	0.	-0.155	0.246

r	1s	2s	2p
2.600	0.	-0.134	0.223
2.700	0.	-0.116	0.203
2.800	0.	-0.101	0.184
2.900	0.	-0.087	0.166
3.000	0.	-0.075	0.150
3.200	0.	-0.056	0.123
3.400	0.	-0.041	0.100
3.600	0.	-0.031	0.082
3.800	0.	-0.023	0.067
4.000	0.	-0.017	0.054
4.200	0.	-0.012	0.044
4.400	0.	-0.009	0.035
4.600	0.	-0.007	0.029
4.800	0.	-0.005	0.023
5.000	0.	-0.004	0.019
5.200	0.	-0.003	0.015
5.400	0.	-0.002	0.012
5.600	0.	-0.001	0.010
5.800	0.	-0.001	0.008
6.000	0.	-0.001	0.006
6.200	0.	-0.001	0.005
6.400	0.	0.	0.004
6.600	0.	0.	0.003
6.800	0.	0.	0.003
7.000	0.	0.	0.002
7.200	0.	0.	0.002
7.400	0.	0.	0.001
7.600	0.	0.	0.001
7.800	0.	0.	0.001
8.000	0.	0.	0.001
8.200	0.	0.	0.001
$\lambda$	52.8	3.15	1.46
$\langle r^{-2} \rangle$	150.	8.65	2.39
$\langle r^{-1} \rangle$	8.63	1.45	1.27
$\langle r \rangle$	0.176	1.00	1.08
$\langle r^2 \rangle$	0.042	1.22	1.54

**F+ 1S**

r	1s	2s	2p
0.001	0.051	0.012	0.
0.002	0.102	0.024	0.
0.004	0.200	0.048	0.
0.006	0.294	0.071	0.001
0.008	0.385	0.093	0.001
0.010	0.473	0.114	0.002
0.015	0.678	0.163	0.005
0.020	0.864	0.207	0.008
0.025	1.033	0.247	0.012
0.030	1.186	0.283	0.018
0.035	1.323	0.315	0.023
0.040	1.446	0.343	0.030
0.050	1.654	0.389	0.045
0.060	1.817	0.423	0.062
0.070	1.940	0.445	0.081
0.080	2.030	0.458	0.101
0.090	2.092	0.462	0.123
0.100	2.130	0.459	0.146
0.120	2.146	0.431	0.193
0.140	2.104	0.388	0.243
0.160	2.023	0.328	0.294
0.180	1.916	0.258	0.345
0.200	1.793	0.180	0.395
0.220	1.662	0.098	0.444

r	1s	2s	2p
0.240	1.520	0.014	0.491
0.260	1.397	-0.071	0.537
0.280	1.270	-0.155	0.580
0.300	1.149	-0.237	0.621
0.350	0.880	-0.428	0.712
0.400	0.662	-0.591	0.787
0.450	0.492	-0.732	0.847
0.500	0.362	-0.843	0.892
0.550	0.264	-0.927	0.924
0.600	0.192	-0.987	0.945
0.650	0.139	-1.027	0.955
0.700	0.100	-1.049	0.958
0.750	0.072	-1.056	0.953
0.800	0.052	-1.051	0.942
0.850	0.038	-1.036	0.927
0.900	0.027	-1.013	0.908
0.950	0.020	-0.984	0.885
1.000	0.015	-0.950	0.860
1.100	0.008	-0.874	0.806
1.200	0.004	-0.792	0.747
1.300	0.003	-0.709	0.688
1.400	0.002	-0.629	0.630
1.500	0.001	-0.554	0.573
1.600	0.001	-0.485	0.520
1.700	0.001	-0.422	0.469
1.800	0.	-0.365	0.422
1.900	0.	-0.315	0.379
2.000	0.	-0.271	0.339
2.100	0.	-0.232	0.303
2.200	0.	-0.199	0.270
2.300	0.	-0.169	0.240
2.400	0.	-0.144	0.213
2.500	0.	-0.122	0.189
2.600	0.	-0.104	0.167
2.700	0.	-0.088	0.148
2.800	0.	-0.074	0.130
2.900	0.	-0.063	0.115
3.000	0.	-0.053	0.101
3.200	0.	-0.037	0.078
3.400	0.	-0.026	0.060
3.600	0.	-0.018	0.046
3.800	0.	-0.013	0.035
4.000	0.	-0.009	0.027
4.200	0.	-0.006	0.021
4.400	0.	-0.004	0.016
4.600	0.	-0.003	0.012
4.800	0.	-0.002	0.009
5.000	0.	-0.001	0.007
5.200	0.	-0.001	0.005
5.400	0.	-0.001	0.004
5.600	0.	-0.	0.003
5.800	0.	-0.	0.002
6.000	0.	-0.	0.002
6.200	0.	-0.	0.001
6.400	0.	-0.	0.001
6.600	0.	-0.	0.001
6.800	0.	-0.	0.001
$\lambda$	54.4	4.44	2.68
$\langle r^{-2} \rangle$	150.	9.30	2.68
$\langle r^{-1} \rangle$	8.63	1.51	1.36
$\langle r \rangle$	0.176	0.958	0.989
$\langle r^2 \rangle$	0.042	1.10	1.25

F <sup>+</sup> 3P			
r	1s	2s	2p
0.001	0.051	0.012	0.
0.002	0.102	0.024	0.
0.004	0.200	0.048	0.
0.006	0.294	0.070	0.001
0.008	0.385	0.092	0.001
0.010	0.473	0.113	0.002
0.015	0.678	0.162	0.005
0.020	0.864	0.207	0.008
0.025	1.033	0.246	0.013
0.030	1.186	0.282	0.018
0.035	1.323	0.314	0.024
0.040	1.446	0.342	0.030
0.050	1.654	0.388	0.045
0.060	1.816	0.421	0.062
0.070	1.940	0.444	0.081
0.080	2.030	0.456	0.102
0.090	2.092	0.461	0.124
0.100	2.129	0.457	0.147
0.120	2.146	0.432	0.195
0.140	2.104	0.387	0.246
0.160	2.023	0.327	0.297
0.180	1.916	0.257	0.348
0.200	1.793	0.180	0.399
0.220	1.662	0.098	0.448
0.240	1.529	0.014	0.496
0.260	1.397	-0.070	0.542
0.280	1.270	-0.154	0.586
0.300	1.149	-0.235	0.627
0.350	0.880	-0.426	0.720
0.400	0.663	-0.591	0.796
0.450	0.492	-0.729	0.857
0.500	0.362	-0.839	0.903
0.550	0.265	-0.923	0.935
0.600	0.192	-0.984	0.956
0.650	0.139	-1.024	0.967
0.700	0.101	-1.046	0.969
0.750	0.073	-1.054	0.964
0.800	0.052	-1.049	0.952
0.850	0.038	-1.034	0.936
0.900	0.028	-1.012	0.915
0.950	0.020	-0.984	0.892
1.000	0.015	-0.950	0.866
1.100	0.008	-0.875	0.808
1.200	0.005	-0.794	0.747
1.300	0.003	-0.711	0.685
1.400	0.002	-0.632	0.624
1.500	0.001	-0.557	0.565
1.600	0.001	-0.488	0.509
1.700	0.001	-0.425	0.457
1.800	0.	-0.368	0.409
1.900	0.	-0.318	0.365
2.000	0.	-0.274	0.324
2.100	0.	-0.235	0.288
2.200	0.	-0.201	0.255
2.300	0.	-0.171	0.225
2.400	0.	-0.146	0.198
2.500	0.	-0.124	0.175
2.600	0.	-0.105	0.154
2.700	0.	-0.089	0.135
2.800	0.	-0.075	0.118
2.900	0.	-0.063	0.103
3.000	0.	-0.053	0.090
3.200	0.	-0.038	0.069
3.400	0.	-0.027	0.052
3.600	0.	-0.019	0.040

$r$	$1s$	$2s$	$2p$
3.800	0.	-0.013	0.030
4.000	0.	-0.009	0.022
4.200	0.	-0.006	0.017
4.400	0.	-0.004	0.013
4.600	0.	-0.003	0.009
4.800	0.	-0.002	0.007
5.000	0.	-0.001	0.005
5.200	0.	-0.001	0.004
5.400	0.	-0.001	0.003
5.600	0.	-0.	0.002
5.800	0.	-0.	0.002
6.000	0.	-0.	0.001
6.200	0.	-0.	0.001
6.400	0.	-0.	0.001
$\lambda$	54.3	4.39	2.89
$\langle r^{-2} \rangle$	150.	9.24	2.73
$\langle r^{-1} \rangle$	8.63	1.50	1.38
$\langle r \rangle$	0.176	0.961	0.970
$\langle r^2 \rangle$	0.042	1.11	1.20

**F<sup>+</sup> 1D**

$r$	$1s$	$2s$	$2p$
0.001	0.051	0.012	0.
0.002	0.102	0.024	0.
0.004	0.200	0.048	0.
0.006	0.294	0.071	0.001
0.008	0.385	0.092	0.001
0.010	0.473	0.113	0.002
0.015	0.678	0.163	0.005
0.020	0.864	0.207	0.008
0.025	1.033	0.247	0.013
0.030	1.186	0.283	0.018
0.035	1.323	0.314	0.024
0.040	1.446	0.343	0.030
0.050	1.654	0.388	0.045
0.060	1.817	0.422	0.062
0.070	1.940	0.444	0.081
0.080	2.030	0.457	0.102
0.090	2.092	0.461	0.123
0.100	2.129	0.458	0.146
0.120	2.146	0.433	0.194
0.140	2.104	0.388	0.245
0.160	2.023	0.328	0.296
0.180	1.916	0.257	0.347
0.200	1.793	0.180	0.397
0.220	1.662	0.098	0.447
0.240	1.529	0.014	0.494
0.260	1.397	-0.070	0.540
0.280	1.270	-0.154	0.583
0.300	1.149	-0.236	0.625
0.350	0.880	-0.427	0.717
0.400	0.682	-0.593	0.792
0.450	0.492	-0.731	0.853
0.500	0.362	-0.841	0.898
0.550	0.264	-0.925	0.931
0.600	0.192	-0.985	0.952
0.650	0.139	-1.025	0.962
0.700	0.101	-1.047	0.965
0.750	0.073	-1.055	0.960
0.800	0.052	-1.050	0.948
0.850	0.038	-1.035	0.932
0.900	0.027	-1.012	0.912

$r$	$1s$	$2s$	$2p$
0.950	0.020	-0.984	0.889
1.000	0.015	-0.950	0.864
1.100	0.008	-0.875	0.807
1.200	0.005	-0.793	0.747
1.300	0.003	-0.711	0.686
1.400	0.002	-0.631	0.626
1.500	0.001	-0.556	0.568
1.600	0.001	-0.486	0.513
1.700	0.001	-0.424	0.462
1.800	0.	-0.367	0.414
1.900	0.	-0.317	0.370
2.000	0.	-0.273	0.330
2.100	0.	-0.234	0.294
2.200	0.	-0.200	0.261
2.300	0.	-0.170	0.231
2.400	0.	-0.145	0.204
2.500	0.	-0.123	0.180
2.600	0.	-0.104	0.159
2.700	0.	-0.088	0.140
2.800	0.	-0.075	0.123
2.900	0.	-0.063	0.108
3.000	0.	-0.053	0.095

3.200	0.	-0.038	0.072
3.400	0.	-0.027	0.055
3.600	0.	-0.019	0.042
3.800	0.	-0.013	0.032
4.000	0.	-0.009	0.024
4.200	0.	-0.006	0.018
4.400	0.	-0.004	0.014
4.600	0.	-0.003	0.010
4.800	0.	-0.002	0.008
5.000	0.	-0.001	0.006
5.200	0.	-0.001	0.004
5.400	0.	-0.001	0.003
5.600	0.	-0.	0.002
5.800	0.	-0.	0.002
6.000	0.	-0.	0.001
6.200	0.	-0.	0.001
6.400	0.	-0.	0.001
6.600	0.	-0.	0.001
$\lambda$	54.3	4.41	2.80
$\langle r^{-2} \rangle$	150.	9.27	2.71
$\langle r^{-1} \rangle$	8.63	1.51	1.37
$\langle r \rangle$	0.176	0.960	0.977
$\langle r^2 \rangle$	0.042	1.11	1.22

**F<sup>++</sup> 1S**

$r$	$1s$	$2s$	$2p$
0.001	0.051	0.013	0.
0.002	0.102	0.025	0.
0.004	0.200	0.050	0.
0.006	0.294	0.073	0.001
0.008	0.385	0.096	0.002
0.010	0.473	0.118	0.002
0.015	0.678	0.169	0.005
0.020	0.865	0.215	0.009
0.025	1.034	0.257	0.014
0.030	1.186	0.294	0.019
0.035	1.323	0.327	0.026
0.040	1.447	0.356	0.033
0.050	1.655	0.404	0.050
0.060	1.817	0.439	0.068

r	1s	2s	2p
0.070	1.941	0.462	0.089
0.080	2.031	0.475	0.112
0.090	2.093	0.480	0.136
0.100	2.130	0.476	0.161
0.120	2.147	0.449	0.214
0.140	2.105	0.402	0.269
0.160	2.023	0.339	0.325
0.180	1.916	0.266	0.381
0.200	1.793	0.185	0.436
0.220	1.662	0.099	0.490
0.240	1.529	0.011	0.542
0.260	1.397	-0.077	0.592
0.280	1.270	-0.164	0.639
0.300	1.149	-0.250	0.684
0.350	0.879	-0.448	0.783
0.400	0.661	-0.620	0.864
0.450	0.491	-0.763	0.927
0.500	0.361	-0.876	0.973
0.550	0.263	-0.961	1.004
0.600	0.191	-1.021	1.021
0.650	0.138	-1.059	1.027
0.700	0.100	-1.079	1.023
0.750	0.072	-1.083	1.011
0.800	0.052	-1.074	0.991
0.850	0.037	-1.054	0.967
0.900	0.027	-1.027	0.937
0.950	0.019	-0.993	0.905
1.000	0.014	-0.954	0.870
1.100	0.007	-0.868	0.796
1.200	0.004	-0.778	0.719
1.300	0.002	-0.688	0.644
1.400	0.001	-0.602	0.572
1.500	0.001	-0.522	0.504
1.600	0.001	-0.449	0.442
1.700	0.	-0.384	0.385
1.800	0.	-0.327	0.334
1.900	0.	-0.277	0.289
2.000	0.	-0.234	0.249
2.100	0.	-0.196	0.214
2.200	0.	-0.164	0.183
2.300	0.	-0.137	0.156
2.400	0.	-0.114	0.133
2.500	0.	-0.095	0.113
2.600	0.	-0.079	0.096
2.700	0.	-0.065	0.081
2.800	0.	-0.054	0.069
2.900	0.	-0.044	0.058
3.000	0.	-0.036	0.049
3.200	0.	-0.024	0.034
3.400	0.	-0.016	0.024
3.600	0.	-0.011	0.017
3.800	0.	-0.007	0.012
4.000	0.	-0.005	0.008
4.200	0.	-0.003	0.006
4.400	0.	-0.002	0.004
4.600	0.	-0.001	0.003
4.800	0.	-0.001	0.002
5.000	0.	-0.001	0.001
5.200	0.	-0.	0.001
5.400	0.	-0.	0.001
$\lambda$	56.2	5.83	4.69
$\langle r^{-2} \rangle$	150.	9.97	3.11
$\langle r^{-1} \rangle$	8.64	1.57	1.49
$\langle r \rangle$	0.176	0.921	0.878
$\langle r^2 \rangle$	0.041	1.01	0.959

F <sup>++</sup> 2P			
r	1s	2s	2p
0.001	0.051	0.013	0.
0.002	0.102	0.025	0.
0.004	0.200	0.050	0.
0.006	0.294	0.074	0.001
0.008	0.385	0.096	0.002
0.010	0.473	0.118	0.002
0.015	0.678	0.170	0.005
0.020	0.865	0.216	0.009
0.025	1.034	0.258	0.014
0.030	1.186	0.295	0.019
0.035	1.324	0.328	0.026
0.040	1.447	0.357	0.033
0.050	1.655	0.405	0.049
0.060	1.817	0.440	0.068
0.070	1.941	0.463	0.088
0.080	2.031	0.477	0.110
0.090	2.093	0.481	0.134
0.100	2.130	0.477	0.159
0.120	2.147	0.451	0.211
0.140	2.105	0.403	0.266
0.160	2.024	0.340	0.321
0.180	1.916	0.266	0.376
0.200	1.793	0.185	0.431
0.220	1.662	0.099	0.484
0.240	1.529	0.011	0.535
0.260	1.397	-0.078	0.584
0.280	1.270	-0.165	0.631
0.300	1.148	-0.251	0.675
0.350	0.879	-0.450	0.772
0.400	0.661	-0.623	0.851
0.450	0.491	-0.766	0.913
0.500	0.360	-0.879	0.958
0.550	0.263	-0.964	0.989
0.600	0.191	-1.024	1.006
0.650	0.138	-1.062	1.013
0.700	0.099	-1.081	1.010
0.750	0.071	-1.084	0.999
0.800	0.051	-1.075	0.981
0.850	0.037	-1.055	0.958
0.900	0.027	-1.027	0.931
0.950	0.019	-0.993	0.901
1.000	0.014	-0.954	0.868
1.100	0.007	-0.867	0.798
1.200	0.004	-0.776	0.726
1.300	0.002	-0.686	0.654
1.400	0.001	-0.599	0.585
1.500	0.001	-0.519	0.520
1.600	0.001	-0.447	0.459
1.700	0.	-0.382	0.404
1.800	0.	-0.325	0.354
1.900	0.	-0.275	0.308
2.000	0.	-0.232	0.268
2.100	0.	-0.195	0.232
2.200	0.	-0.163	0.200
2.300	0.	-0.136	0.173
2.400	0.	-0.113	0.148
2.500	0.	-0.094	0.127
2.600	0.	-0.078	0.109
2.700	0.	-0.064	0.093
2.800	0.	-0.053	0.079
2.900	0.	-0.044	0.068
3.000	0.	-0.036	0.057
3.200	0.	-0.024	0.041
3.400	0.	-0.016	0.030
3.600	0.	-0.011	0.021

r	1s	2s	2p
3.800	0.	-0.007	0.015
4.000	0.	-0.005	0.011
4.200	0.	-0.003	0.007
4.400	0.	-0.002	0.005
4.600	0.	-0.001	0.004
4.800	0.	-0.001	0.003
5.000	0.	-0.001	0.002
5.200	0.	-0.	0.001
5.400	0.	-0.	0.001
5.600	0.	-0.	0.001
$\lambda$	56.3	5.88	4.34
$\langle r^{-2} \rangle$	150.	10.0	3.04
$\langle r^{-1} \rangle$	8.64	1.57	1.47
$\langle r \rangle$	0.175	0.918	0.897
$\langle r^{+2} \rangle$	0.041	1.00	1.01

r	1s	2s	2p
1.100	0.007	-0.868	0.797
1.200	0.004	-0.777	0.724
1.300	0.002	-0.686	0.650
1.400	0.001	-0.600	0.580
1.500	0.001	-0.520	0.514
1.600	0.001	-0.448	0.452
1.700	0.	-0.383	0.396
1.800	0.	-0.326	0.346
1.900	0.	-0.276	0.301
2.000	0.	-0.233	0.260
2.100	0.	-0.195	0.225
2.200	0.	-0.164	0.193
2.300	0.	-0.136	0.166
2.400	0.	-0.114	0.142
2.500	0.	-0.094	0.121
2.600	0.	-0.078	0.104
2.700	0.	-0.065	0.088
2.800	0.	-0.053	0.075
2.900	0.	-0.044	0.064
3.000	0.	-0.036	0.054
3.200	0.	-0.024	0.038
3.400	0.	-0.016	0.027
3.600	0.	-0.011	0.019
3.800	0.	-0.007	0.014
4.000	0.	-0.005	0.010
4.200	0.	-0.003	0.007
4.400	0.	-0.002	0.005
4.600	0.	-0.001	0.003
4.800	0.	-0.001	0.002
5.000	0.	-0.001	0.002
5.200	0.	-0.	0.001
5.400	0.	-0.	0.001
5.600	0.	-0.	0.001
$\lambda$	56.2	5.86	4.48
$\langle r^{-2} \rangle$	150.	10.0	3.07
$\langle r^{-1} \rangle$	8.64	1.57	1.47
$\langle r \rangle$	0.176	0.919	0.890
$\langle r^2 \rangle$	0.041	1.01	0.988

**F<sup>++</sup> 2D**

r	1s	2s	2p
0.001	0.051	0.013	0.
0.002	0.102	0.025	0.
0.004	0.200	0.050	0.
0.006	0.294	0.074	0.001
0.008	0.385	0.096	0.002
0.010	0.473	0.118	0.002
0.015	0.678	0.169	0.005
0.020	0.865	0.216	0.009
0.025	1.034	0.257	0.014
0.030	1.186	0.295	0.019
0.035	1.324	0.328	0.026
0.040	1.447	0.357	0.033
0.050	1.655	0.405	0.049
0.060	1.817	0.440	0.068
0.070	1.941	0.463	0.089
0.080	2.031	0.476	0.111
0.090	2.093	0.480	0.135
0.100	2.130	0.477	0.160
0.120	2.147	0.450	0.212
0.140	2.105	0.403	0.267
0.160	2.024	0.340	0.323
0.180	1.916	0.266	0.378
0.200	1.793	0.185	0.433
0.220	1.662	0.099	0.486
0.240	1.529	0.011	0.538
0.260	1.397	-0.077	0.587
0.280	1.270	-0.165	0.634
0.300	1.148	-0.250	0.678
0.350	0.879	-0.449	0.777
0.400	0.661	-0.622	0.856
0.450	0.491	-0.765	0.919
0.500	0.361	-0.878	0.964
0.550	0.263	-0.963	0.995
0.600	0.191	-1.023	1.012
0.650	0.138	-1.061	1.019
0.700	0.099	-1.080	1.015
0.750	0.072	-1.084	1.003
0.800	0.051	-1.074	0.985
0.850	0.037	-1.055	0.962
0.900	0.027	-1.027	0.934
0.950	0.019	-0.993	0.903
1.000	0.014	-0.954	0.869

**Ne 1S**

r	1s	2s	2p
0.001	0.060	0.014	0.
0.002	0.119	0.028	0.
0.004	0.233	0.055	0.
0.006	0.343	0.081	0.001
0.008	0.449	0.105	0.002
0.010	0.550	0.129	0.003
0.015	0.785	0.184	0.006
0.020	0.995	0.233	0.010
0.025	1.184	0.276	0.015
0.030	1.352	0.314	0.022
0.035	1.501	0.348	0.029
0.040	1.633	0.377	0.037
0.050	1.849	0.422	0.055
0.060	2.011	0.452	0.075
0.070	2.127	0.470	0.097

r	1s	2s	2p	r	1s	2s	2p
0.080	2.204	0.476	0.121	$\langle r^{-2} \rangle$	187.	11.1	3.06
0.090	2.249	0.473	0.147	$\langle r^{-1} \rangle$	9.62	1.63	1.44
0.100	2.267	0.461	0.173	$\langle r \rangle$	0.158	0.892	0.965
				$\langle r^2 \rangle$	0.033	0.967	1.23
0.120	2.241	0.417	0.228	<b>Ne<sup>+</sup> 'P</b>			
0.140	2.156	0.352	0.285	r	1s	2s	2p
0.160	2.033	0.272	0.342	0.001	0.060	0.015	0.
0.180	1.889	0.183	0.398	0.002	0.119	0.029	0.
0.200	1.734	0.089	0.452	0.004	0.233	0.057	0.
0.220	1.577	-0.008	0.504	0.006	0.343	0.083	0.001
0.240	1.424	-0.105	0.554	0.008	0.449	0.109	0.002
0.260	1.277	-0.200	0.601	0.010	0.550	0.133	0.003
0.280	1.139	-0.292	0.645	0.015	0.785	0.190	0.006
0.300	1.012	-0.380	0.686	0.020	0.996	0.240	0.011
0.350	0.740	-0.577	0.774	0.025	1.184	0.285	0.017
0.400	0.533	-0.740	0.844	0.030	1.352	0.324	0.023
0.450	0.379	-0.867	0.895	0.035	1.501	0.359	0.031
0.500	0.267	-0.961	0.931	0.040	1.633	0.389	0.039
0.550	0.187	-1.026	0.954	0.050	1.849	0.435	0.059
0.600	0.131	-1.066	0.965	0.060	2.011	0.467	0.081
0.650	0.091	-1.085	0.966	0.070	2.127	0.485	0.105
0.700	0.064	-1.087	0.960	0.080	2.205	0.491	0.131
0.750	0.045	-1.077	0.948	0.090	2.250	0.487	0.158
0.800	0.031	-1.055	0.931	0.100	2.268	0.475	0.187
0.850	0.022	-1.026	0.910	0.120	2.242	0.429	0.246
0.900	0.016	-0.991	0.886	0.140	2.156	0.362	0.307
0.950	0.011	-0.951	0.859	0.160	2.033	0.280	0.368
1.000	0.008	-0.909	0.832	0.180	1.889	0.188	0.428
1.100	0.005	-0.821	0.774	0.200	1.734	0.090	0.487
1.200	0.003	-0.732	0.714	0.220	1.577	-0.010	0.543
1.300	0.002	-0.647	0.656	0.240	1.424	-0.110	0.596
1.400	0.001	-0.567	0.600	0.260	1.277	-0.209	0.646
1.500	0.001	-0.495	0.547	0.280	1.139	-0.304	0.693
1.600	0.001	-0.430	0.497	0.300	1.012	-0.394	0.736
1.700	0.	-0.372	0.451	0.350	0.740	-0.598	0.830
1.800	0.	-0.320	0.408	0.400	0.532	-0.765	0.902
1.900	0.	-0.275	0.368	0.450	0.378	-0.895	0.955
2.000	0.	-0.236	0.332	0.500	0.268	-0.990	0.990
2.100	0.	-0.202	0.300	0.550	0.187	-1.055	1.010
2.200	0.	-0.173	0.270	0.600	0.130	-1.094	1.018
2.300	0.	-0.147	0.242	0.650	0.091	-1.111	1.016
2.400	0.	-0.125	0.218	0.700	0.063	-1.111	1.004
2.500	0.	-0.107	0.195	0.750	0.044	-1.096	0.988
2.600	0.	-0.091	0.175	0.800	0.031	-1.071	0.963
2.700	0.	-0.077	0.157	0.850	0.022	-1.038	0.936
2.800	0.	-0.065	0.141	0.900	0.015	-0.998	0.905
2.900	0.	-0.055	0.126	0.950	0.011	-0.954	0.872
3.000	0.	-0.047	0.113	1.000	0.008	-0.908	0.838
3.200	0.	-0.034	0.090	1.100	0.004	-0.812	0.767
3.400	0.	-0.024	0.072	1.200	0.002	-0.716	0.696
3.600	0.	-0.017	0.057	1.300	0.002	-0.625	0.627
3.800	0.	-0.012	0.046	1.400	0.001	-0.541	0.562
4.000	0.	-0.009	0.036	1.500	0.001	-0.465	0.501
4.200	0.	-0.006	0.029	1.600	0.001	-0.397	0.445
4.400	0.	-0.004	0.023	1.700	0.	-0.338	0.394
4.600	0.	-0.003	0.018	1.800	0.	-0.286	0.347
4.800	0.	-0.002	0.014	1.900	0.	-0.242	0.305
5.000	0.	-0.002	0.011	2.000	0.	-0.203	0.268
5.200	0.	-0.001	0.009	2.100	0.	-0.170	0.235
5.400	0.	-0.001	0.007	2.200	0.	-0.143	0.205
5.600	0.	-0.001	0.006	2.300	0.	-0.119	0.179
5.800	0.	0.	0.004				
6.000	0.	0.	0.003				
6.200	0.	0.	0.003				
6.400	0.	0.	0.002				
6.600	0.	0.	0.002				
6.800	0.	0.	0.001				
7.000	0.	0.	0.001				
7.200	0.	0.	0.001				
7.400	0.	0.	0.001				
$\lambda$	65.5	3.86	1.70				

r	1s	2s	2p
2.400	0.	-0.099	0.156
2.500	0.	-0.082	0.135
2.600	0.	-0.068	0.118
2.700	0.	-0.057	0.102
2.800	0.	-0.047	0.088
2.900	0.	-0.039	0.076
3.000	0.	-0.032	0.066
3.200	0.	-0.022	0.049
3.400	0.	-0.015	0.036
3.600	0.	-0.010	0.027
3.800	0.	-0.007	0.020
4.000	0.	-0.004	0.015
4.200	0.	-0.003	0.011
4.400	0.	-0.002	0.008
4.600	0.	-0.001	0.006
4.800	0.	-0.001	0.004
5.000	0.	-0.001	0.003
5.200	0.	0.	0.002
5.400	0.	0.	0.002
5.600	0.	0.	0.001
5.800	0.	0.	0.001
6.000	0.	0.	0.001

$\lambda$	67.2	5.24	3.21
$\langle r^{-2} \rangle$	186.	11.7	3.42
$\langle r^{-1} \rangle$	9.62	1.69	1.54
$\langle r \rangle$	0.158	0.860	0.876
$\langle r^2 \rangle$	0.033	0.890	0.982

### Ne<sup>++</sup> 1S

r	1s	2s	2p
0.001	0.060	0.015	0.
0.002	0.119	0.030	0.
0.004	0.234	0.059	0.001
0.006	0.343	0.086	0.001
0.008	0.449	0.113	0.002
0.010	0.550	0.138	0.003
0.015	0.785	0.197	0.007
0.020	0.996	0.249	0.012
0.025	1.185	0.296	0.018
0.030	1.353	0.337	0.025
0.035	1.502	0.373	0.033
0.040	1.634	0.404	0.042
0.050	1.850	0.452	0.063
0.060	2.012	0.485	0.087
0.070	2.128	0.503	0.112
0.080	2.205	0.510	0.140
0.090	2.250	0.506	0.170
0.100	2.269	0.493	0.200
0.120	2.242	0.445	0.263
0.140	2.157	0.374	0.329
0.160	2.034	0.288	0.394
0.180	1.889	0.192	0.458
0.200	1.734	0.090	0.520
0.220	1.577	-0.014	0.579
0.240	1.423	-0.118	0.636
0.260	1.276	-0.221	0.689
0.280	1.138	-0.320	0.738
0.300	1.011	-0.414	0.783
0.350	0.739	-0.626	0.880
0.400	0.531	-0.798	0.933
0.450	0.377	-0.931	1.005
0.500	0.265	-1.027	1.039

r	1s	2s	2p
0.550	0.185	-1.091	1.055
0.600	0.129	-1.128	1.059
0.650	0.090	-1.141	1.051
0.700	0.062	-1.136	1.034
0.750	0.043	-1.117	1.009
0.800	0.030	-1.086	0.980
0.850	0.021	-1.047	0.946
0.900	0.015	-1.001	0.909
0.950	0.010	-0.952	0.870
1.000	0.007	-0.900	0.830
1.100	0.004	-0.794	0.748
1.200	0.002	-0.690	0.668
1.300	0.001	-0.593	0.591
1.400	0.001	-0.505	0.520
1.500	0.001	-0.426	0.454
1.600	0.	-0.358	0.395
1.700	0.	-0.298	0.342
1.800	0.	-0.248	0.295
1.900	0.	-0.205	0.254
2.000	0.	-0.168	0.217
2.100	0.	-0.138	0.186
2.200	0.	-0.113	0.158
2.300	0.	-0.092	0.134
2.400	0.	-0.075	0.114
2.500	0.	-0.061	0.096
2.600	0.	-0.049	0.081
2.700	0.	-0.040	0.069
2.800	0.	-0.032	0.058
2.900	0.	-0.026	0.049
3.000	0.	-0.021	0.041

3.200	0.	-0.013	0.029
3.400	0.	-0.009	0.020
3.600	0.	-0.005	0.014
3.800	0.	-0.003	0.010
4.000	0.	-0.002	0.007
4.200	0.	-0.001	0.005
4.400	0.	-0.001	0.003
4.600	0.	-0.001	0.002
4.800	0.	0.	0.001
5.000	0.	0.	0.001
5.200	0.	0.	0.001

$\lambda$	69.4	6.87	4.76
$\langle r^{-2} \rangle$	186.	12.5	3.75
$\langle r^{-1} \rangle$	9.62	1.75	1.62
$\langle r \rangle$	0.157	0.827	0.817
$\langle r^2 \rangle$	0.033	0.815	0.841

### Ne<sup>++</sup> 3P

r	1s	2s	2p
0.001	0.060	0.015	0.
0.002	0.119	0.030	0.
0.004	0.234	0.059	0.001
0.006	0.343	0.086	0.001
0.008	0.449	0.113	0.002
0.010	0.550	0.138	0.003
0.015	0.785	0.197	0.007
0.020	0.996	0.249	0.012
0.025	1.185	0.295	0.018
0.030	1.353	0.336	0.025
0.035	1.502	0.372	0.033
0.040	1.634	0.403	0.043



r	1s	2s	2p
0.050	1.850	0.451	0.063
0.060	2.012	0.483	0.087
0.070	2.128	0.502	0.113
0.080	2.205	0.508	0.141
0.090	2.250	0.504	0.171
0.100	2.268	0.492	0.202
0.120	2.242	0.444	0.265
0.140	2.157	0.374	0.331
0.160	2.034	0.288	0.397
0.180	1.889	0.192	0.461
0.200	1.734	0.091	0.524
0.220	1.577	-0.014	0.584
0.240	1.423	-0.118	0.641
0.260	1.277	-0.220	0.695
0.280	1.139	-0.319	0.744
0.300	1.011	-0.413	0.790
0.350	0.739	-0.624	0.888
0.400	0.531	-0.796	0.963
0.450	0.377	-0.929	1.016
0.500	0.265	-1.025	1.045
0.550	0.185	-1.089	1.066
0.600	0.129	-1.126	1.069
0.650	0.090	-1.140	1.060
0.700	0.062	-1.135	1.042
0.750	0.043	-1.116	1.016
0.800	0.030	-1.085	0.985
0.850	0.021	-1.047	0.950
0.900	0.015	-1.002	0.911
0.950	0.010	-0.953	0.870
1.000	0.008	-0.901	0.828
1.100	0.004	-0.795	0.744
1.200	0.002	-0.692	0.661
1.300	0.001	-0.595	0.582
1.400	0.001	-0.507	0.509
1.500	0.001	-0.428	0.442
1.600	0.	-0.359	0.382
1.700	0.	-0.300	0.329
1.800	0.	-0.249	0.282
1.900	0.	-0.206	0.241
2.000	0.	-0.170	0.205
2.100	0.	-0.139	0.174
2.200	0.	-0.114	0.147
2.300	0.	-0.093	0.124
2.400	0.	-0.076	0.104
2.500	0.	-0.061	0.088
2.600	0.	-0.050	0.074
2.700	0.	-0.040	0.062
2.800	0.	-0.032	0.052
2.900	0.	-0.026	0.043
3.000	0.	-0.021	0.036
3.200	0.	-0.014	0.025
3.400	0.	-0.009	0.017
3.600	0.	-0.006	0.012
3.800	0.	-0.004	0.008
4.000	0.	-0.002	0.005
4.200	0.	-0.001	0.004
4.400	0.	-0.001	0.003
4.600	0.	-0.001	0.002
4.800	0.	-0.	0.001
5.000	0.	-0.	0.001
5.200	0.	-0.	0.001
$\lambda$	69.3	6.82	5.03
$\langle r^{-1} \rangle$	186.	12.5	3.81
$\langle r^{-2} \rangle$	9.62	1.75	1.64
$\langle r^{-3} \rangle$	0.157	0.828	0.805
$\langle r^{-4} \rangle$	0.033	0.818	0.812

Ne <sup>++</sup> 1D			
r	1s	2s	2p
0.001	0.060	0.015	0.
0.002	0.119	0.030	0.
0.004	0.234	0.059	0.001
0.006	0.343	0.086	0.001
0.008	0.449	0.113	0.002
0.010	0.550	0.138	0.003
0.015	0.785	0.197	0.007
0.020	0.996	0.249	0.012
0.025	1.185	0.296	0.018
0.030	1.353	0.337	0.025
0.035	1.502	0.372	0.033
0.040	1.634	0.403	0.042
0.050	1.850	0.451	0.063
0.060	2.012	0.484	0.087
0.070	2.128	0.502	0.113
0.080	2.205	0.509	0.141
0.090	2.250	0.505	0.170
0.100	2.268	0.492	0.201
0.120	2.242	0.444	0.265
0.140	2.157	0.374	0.330
0.160	2.034	0.288	0.395
0.180	1.889	0.192	0.460
0.200	1.734	0.091	0.522
0.220	1.577	-0.014	0.582
0.240	1.423	-0.118	0.639
0.260	1.276	-0.220	0.692
0.280	1.139	-0.319	0.742
0.300	1.011	-0.413	0.787
0.350	0.739	-0.624	0.885
0.400	0.531	-0.797	0.959
0.450	0.377	-0.930	1.012
0.500	0.265	-1.026	1.045
0.550	0.185	-1.090	1.062
0.600	0.129	-1.127	1.065
0.650	0.090	-1.140	1.056
0.700	0.062	-1.136	1.039
0.750	0.043	-1.116	1.014
0.800	0.030	-1.086	0.983
0.850	0.021	-1.047	0.948
0.900	0.015	-1.001	0.910
0.950	0.010	-0.952	0.870
1.000	0.007	-0.901	0.829
1.100	0.004	-0.795	0.745
1.200	0.002	-0.691	0.664
1.300	0.001	-0.594	0.586
1.400	0.001	-0.506	0.513
1.500	0.001	-0.427	0.447
1.600	0.	-0.359	0.387
1.700	0.	-0.299	0.334
1.800	0.	-0.248	0.287
1.900	0.	-0.205	0.246
2.000	0.	-0.169	0.210
2.100	0.	-0.139	0.178
2.200	0.	-0.114	0.151
2.300	0.	-0.093	0.128
2.400	0.	-0.075	0.108
2.500	0.	-0.061	0.091
2.600	0.	-0.050	0.077
2.700	0.	-0.040	0.064
2.800	0.	-0.032	0.054
2.900	0.	-0.026	0.045
3.000	0.	-0.021	0.038
3.200	0.	-0.014	0.026
3.400	0.	-0.009	0.018
3.600	0.	-0.006	0.013

r	1s	2s	2p
3.800	0.	-0.004	0.009
4.000	0.	-0.002	0.006
4.200	0.	-0.001	0.004
4.400	0.	-0.001	0.003
4.600	0.	-0.001	0.002
4.800	0.	-0.	0.001
5.000	0.	-0.	0.001
5.200	0.	-0.	0.001

$\lambda$	1s	2s	2p
$\lambda$	69.3	6.84	4.92
$\langle r^{-1} \rangle$	186.	12.5	3.79
$\langle r^{-2} \rangle$	9.62	1.75	1.63
$\langle r^{-3} \rangle$	0.157	0.828	0.809
$\langle r^{-4} \rangle$	0.033	0.817	0.824

Na <sup>2</sup>S

r	1s	2s	2p	3s
0.001	0.069	0.017	0.	0.003
0.002	0.137	0.034	0.	0.005
0.004	0.269	0.068	0.001	0.010
0.006	0.395	0.096	0.001	0.014
0.008	0.515	0.126	0.002	0.019
0.010	0.630	0.154	0.004	0.023
0.015	0.894	0.218	0.008	0.033
0.020	1.129	0.274	0.014	0.041
0.025	1.336	0.324	0.021	0.048
0.030	1.518	0.366	0.030	0.055
0.035	1.677	0.403	0.039	0.060
0.040	1.815	0.434	0.050	0.065
0.050	2.036	0.480	0.074	0.072
0.060	2.192	0.507	0.102	0.076
0.070	2.296	0.519	0.131	0.077
0.080	2.357	0.517	0.163	0.077
0.090	2.381	0.504	0.196	0.075
0.100	2.377	0.481	0.231	0.071
0.120	2.305	0.412	0.301	0.060
0.140	2.175	0.321	0.373	0.046
0.160	2.012	0.215	0.443	0.030
0.180	1.834	0.102	0.512	0.013
0.200	1.652	-0.015	0.577	-0.005
0.220	1.474	-0.132	0.639	-0.023
0.240	1.306	-0.240	0.696	-0.040
0.260	1.149	-0.355	0.749	-0.057
0.280	1.007	-0.459	0.797	-0.072
0.300	0.877	-0.555	0.841	-0.086
0.350	0.613	-0.763	0.931	-0.116
0.400	0.422	-0.923	0.996	-0.138
0.450	0.287	-1.037	1.037	-0.151
0.500	0.194	-1.112	1.060	-0.157
0.550	0.130	-1.154	1.066	-0.157
0.600	0.088	-1.169	1.060	-0.152
0.650	0.059	-1.162	1.044	-0.143
0.700	0.040	-1.139	1.020	-0.130
0.750	0.027	-1.105	0.990	-0.115
0.800	0.018	-1.061	0.956	-0.097
0.850	0.013	-1.011	0.919	-0.078
0.900	0.009	-0.958	0.880	-0.058
0.950	0.006	-0.902	0.840	-0.037
1.000	0.005	-0.846	0.799	-0.015
1.100	0.003	-0.736	0.719	0.029

r	1s	2s	2p	3s
1.200	0.002	-0.633	0.641	0.073
1.300	0.001	-0.539	0.569	0.116
1.400	0.001	-0.455	0.502	0.157
1.500	0.001	-0.382	0.441	0.196
1.600	0.	-0.319	0.386	0.232
1.700	0.	-0.266	0.337	0.267
1.800	0.	-0.220	0.293	0.298
1.900	0.	-0.182	0.255	0.328
2.000	0.	-0.150	0.221	0.355
2.100	0.	-0.123	0.191	0.379
2.200	0.	-0.101	0.165	0.401
2.300	0.	-0.082	0.143	0.421
2.400	0.	-0.067	0.123	0.438
2.500	0.	-0.055	0.106	0.453
2.600	0.	-0.045	0.091	0.467
2.700	0.	-0.036	0.078	0.478
2.800	0.	-0.030	0.067	0.487
2.900	0.	-0.024	0.058	0.495
3.000	0.	-0.019	0.050	0.501

3.200	0.	-0.013	0.037	0.509
3.400	0.	-0.008	0.027	0.511
3.600	0.	-0.005	0.020	0.508
3.800	0.	-0.004	0.015	0.502
4.000	0.	-0.002	0.011	0.492
4.200	0.	-0.002	0.008	0.480
4.400	0.	-0.001	0.006	0.466
4.600	0.	-0.001	0.004	0.449
4.800	0.	-0.	0.003	0.432
5.000	0.	-0.	0.002	0.414
5.200	0.	-0.	0.002	0.395
5.400	0.	-0.	0.001	0.375
5.600	0.	-0.	0.001	0.356
5.800	0.	-0.	0.001	0.337
6.000	0.	-0.	0.001	0.318
6.200	0.	-0.	0.001	0.299
6.400	0.	-0.	0.	0.281
6.600	0.	-0.	0.	0.263
6.800	0.	-0.	0.	0.246
7.000	0.	-0.	0.	0.230
7.200	0.	-0.	0.	0.215
7.400	0.	-0.	0.	0.200
7.600	0.	-0.	0.	0.186
7.800	0.	-0.	0.	0.173
8.000	0.	-0.	0.	0.160
8.200	0.	-0.	0.	0.148
8.400	0.	-0.	0.	0.137
8.600	0.	-0.	0.	0.127
8.800	0.	-0.	0.	0.117
9.000	0.	-0.	0.	0.108

9.500	0.	-0.	0.	0.088
10.000	0.	-0.	0.	0.071
10.500	0.	-0.	0.	0.057
11.000	0.	-0.	0.	0.046
11.500	0.	-0.	0.	0.037
12.000	0.	-0.	0.	0.029
12.500	0.	-0.	0.	0.023
13.000	0.	-0.	0.	0.018
13.500	0.	-0.	0.	0.015
14.000	0.	-0.	0.	0.011
14.500	0.	-0.	0.	0.009
15.000	0.	-0.	0.	0.007
15.500	0.	-0.	0.	0.006
16.000	0.	-0.	0.	0.004
16.500	0.	-0.	0.	0.003
17.000	0.	-0.	0.	0.003
17.500	0.	-0.	0.	0.002
18.000	0.	-0.	0.	0.002
18.500	0.	0.	0.	0.001
19.000	0.	0.	0.	0.001
19.500	0.	0.	0.	0.001
20.000	0.	0.	0.	0.001

$\lambda$	1s	2s	2p	3s
$\lambda$	81.0	5.59	3.04	0.364

r	1s	2s	2p	3s
$\langle r^{-3} \rangle$	226.	14.4	4.19	0.394
$\langle r^{-1} \rangle$	10.6	1.87	1.70	0.301
$\langle r \rangle$	0.143	0.779	0.798	4.21
$\langle r^2 \rangle$	0.027	0.731	0.822	20.7

**Na<sup>+</sup> 1S**

r	1s	2s	2p
0.001	0.070	0.017	0.
0.002	0.138	0.034	0.
0.004	0.269	0.066	0.001
0.006	0.395	0.096	0.001
0.008	0.515	0.126	0.002
0.010	0.630	0.154	0.004
0.015	0.894	0.218	0.008
0.020	1.129	0.274	0.014
0.025	1.336	0.324	0.021
0.030	1.518	0.366	0.030
0.035	1.677	0.403	0.039
0.040	1.815	0.434	0.050
0.050	2.036	0.479	0.074
0.060	2.192	0.507	0.102
0.070	2.296	0.519	0.132
0.080	2.357	0.517	0.163
0.090	2.381	0.504	0.197
0.100	2.377	0.481	0.231
0.120	2.305	0.412	0.302
0.140	2.175	0.321	0.373
0.160	2.012	0.215	0.444
0.180	1.834	0.102	0.512
0.200	1.652	-0.015	0.578
0.220	1.474	-0.132	0.639
0.240	1.306	-0.246	0.697
0.260	1.149	-0.355	0.750
0.280	1.007	-0.459	0.798
0.300	0.877	-0.555	0.842
0.350	0.613	-0.763	0.932
0.400	0.422	-0.923	0.997
0.450	0.287	-1.037	1.038
0.500	0.194	-1.112	1.061
0.550	0.130	-1.154	1.067
0.600	0.088	-1.169	1.061
0.650	0.059	-1.162	1.045
0.700	0.040	-1.139	1.021
0.750	0.027	-1.105	0.991
0.800	0.018	-1.061	0.957
0.850	0.013	-1.011	0.920
0.900	0.009	-0.958	0.881
0.950	0.006	-0.903	0.840
1.000	0.005	-0.847	0.799
1.100	0.003	-0.736	0.719
1.200	0.002	-0.633	0.641
1.300	0.001	-0.539	0.568
1.400	0.001	-0.455	0.501
1.500	0.001	-0.382	0.440
1.600	0.	-0.319	0.385
1.700	0.	-0.266	0.335
1.800	0.	-0.220	0.292
1.900	0.	-0.182	0.253
2.000	0.	-0.150	0.219
2.100	0.	-0.123	0.189
2.200	0.	-0.101	0.163
2.300	0.	-0.082	0.140
2.400	0.	-0.067	0.121

r	1s	2s	2p
2.500	0.	-0.055	0.103
2.600	0.	-0.044	0.089
2.700	0.	-0.036	0.076
2.800	0.	-0.029	0.065
2.900	0.	-0.024	0.055
3.000	0.	-0.019	0.047
3.200	0.	-0.013	0.034
3.400	0.	-0.008	0.025
3.600	0.	-0.005	0.018
3.800	0.	-0.003	0.013
4.000	0.	-0.002	0.009
4.200	0.	-0.001	0.007
4.400	0.	-0.001	0.005
4.600	0.	-0.001	0.003
4.800	0.	0.	0.002
5.000	0.	0.	0.002
5.200	0.	0.	0.001
5.400	0.	0.	0.001
5.600	0.	0.	0.001
$\lambda$	81.5	6.15	3.60
$\langle r^{-3} \rangle$	227.	14.4	4.20
$\langle r^{-1} \rangle$	10.6	1.87	1.70
$\langle r \rangle$	0.143	0.779	0.796
$\langle r^2 \rangle$	0.027	0.731	0.816

**Na<sup>++</sup> 1P**

r	1s	2s	2p
0.001	0.070	0.018	0.
0.002	0.138	0.035	0.
0.004	0.269	0.068	0.001
0.006	0.395	0.099	0.001
0.008	0.515	0.130	0.003
0.010	0.630	0.158	0.004
0.015	0.894	0.225	0.009
0.020	1.129	0.283	0.015
0.025	1.336	0.334	0.023
0.030	1.519	0.378	0.032
0.035	1.678	0.416	0.042
0.040	1.816	0.447	0.054
0.050	2.036	0.495	0.079
0.060	2.193	0.523	0.109
0.070	2.297	0.535	0.140
0.080	2.357	0.533	0.174
0.090	2.382	0.519	0.210
0.100	2.378	0.495	0.247
0.120	2.305	0.424	0.322
0.140	2.175	0.329	0.398
0.160	2.012	0.220	0.473
0.180	1.834	0.103	0.546
0.200	1.652	-0.018	0.615
0.220	1.474	-0.139	0.681
0.240	1.305	-0.257	0.741
0.260	1.149	-0.370	0.797
0.280	1.006	-0.477	0.848
0.300	0.877	-0.576	0.894
0.350	0.612	-0.790	0.987
0.400	0.421	-0.954	1.052
0.450	0.286	-1.069	1.092
0.500	0.193	-1.144	1.111
0.550	0.129	-1.183	1.112

r	1s	2s	2p
0.600	0.087	-1.194	1.100
0.650	0.058	-1.184	1.077
0.700	0.039	-1.156	1.046
0.750	0.026	-1.115	1.008
0.800	0.018	-1.066	0.966
0.850	0.012	-1.011	0.921
0.900	0.009	-0.953	0.875
0.950	0.006	-0.892	0.827
1.000	0.004	-0.832	0.780
1.100	0.002	-0.714	0.687
1.200	0.001	-0.604	0.600
1.300	0.001	-0.506	0.520
1.400	0.001	-0.421	0.447
1.500	0.	-0.347	0.382
1.600	0.	-0.284	0.326
1.700	0.	-0.232	0.276
1.800	0.	-0.188	0.233
1.900	0.	-0.152	0.196
2.000	0.	-0.122	0.165
2.100	0.	-0.098	0.138
2.200	0.	-0.079	0.115
2.300	0.	-0.063	0.096
2.400	0.	-0.050	0.080
2.500	0.	-0.040	0.066
2.600	0.	-0.031	0.055
2.700	0.	-0.025	0.045
2.800	0.	-0.020	0.037
2.900	0.	-0.016	0.031
3.000	0.	-0.012	0.025
3.200	0.	-0.008	0.017
3.400	0.	-0.005	0.012
3.600	0.	-0.003	0.008
3.800	0.	-0.002	0.005
4.000	0.	-0.001	0.003
4.200	0.	-0.001	0.002
4.400	0.	0.	0.002
4.600	0.	0.	0.001
4.800	0.	0.	0.001
$\lambda$	83.7	7.86	5.49
$\langle r^{-3} \rangle$	226.	15.2	4.61
$\langle r^{-1} \rangle$	10.6	1.93	1.80
$\langle r \rangle$	0.143	0.753	0.739
$\langle r^2 \rangle$	0.027	0.678	0.689

Mg <sup>18</sup>S

r	1s	2s	2p	3s
0.001	0.079	0.020	0.	0.004
0.002	0.157	0.040	0.	0.008
0.004	0.306	0.077	0.001	0.015
0.006	0.448	0.113	0.002	0.022
0.008	0.584	0.147	0.003	0.028
0.010	0.712	0.180	0.005	0.035
0.015	1.006	0.253	0.011	0.049
0.020	1.264	0.317	0.018	0.061
0.025	1.488	0.372	0.028	0.072
0.030	1.683	0.419	0.039	0.081
0.035	1.850	0.458	0.052	0.088
0.040	1.993	0.490	0.066	0.094
0.050	2.213	0.535	0.097	0.103
0.060	2.360	0.557	0.132	0.107
0.070	2.447	0.561	0.170	0.107
0.080	2.487	0.549	0.210	0.105
0.090	2.489	0.524	0.252	0.100
0.100	2.461	0.488	0.295	0.092

r	1s	2s	2p	3s
0.120	2.340	0.391	0.381	0.073
0.140	2.166	0.271	0.468	0.049
0.160	1.966	0.139	0.552	0.023
0.180	1.758	0.	0.631	-0.005
0.200	1.553	-0.138	0.706	-0.032
0.220	1.360	-0.274	0.775	-0.058
0.240	1.182	-0.402	0.837	-0.083
0.260	1.022	-0.523	0.894	-0.106
0.280	0.878	-0.635	0.944	-0.127
0.300	0.751	-0.736	0.988	-0.146
0.350	0.502	-0.944	1.073	-0.182
0.400	0.330	-1.092	1.126	-0.205
0.450	0.215	-1.185	1.151	-0.214
0.500	0.139	-1.233	1.155	-0.212
0.550	0.090	-1.246	1.141	-0.202
0.600	0.058	-1.232	1.114	-0.184
0.650	0.038	-1.197	1.078	-0.161
0.700	0.025	-1.149	1.034	-0.133
0.750	0.016	-1.090	0.987	-0.102
0.800	0.011	-1.025	0.936	-0.069
0.850	0.007	-0.958	0.884	-0.035
0.900	0.005	-0.889	0.831	0.
0.950	0.004	-0.821	0.779	0.036
1.000	0.003	-0.755	0.728	0.071
1.100	0.001	-0.631	0.631	0.140
1.200	0.001	-0.521	0.543	0.205
1.300	0.001	-0.426	0.463	0.266
1.400	0.	-0.345	0.394	0.321
1.500	0.	-0.278	0.333	0.370
1.600	0.	-0.223	0.280	0.414
1.700	0.	-0.178	0.235	0.452
1.800	0.	-0.142	0.197	0.484
1.900	0.	-0.112	0.164	0.512
2.000	0.	-0.089	0.137	0.534
2.100	0.	-0.070	0.114	0.552
2.200	0.	-0.055	0.095	0.566
2.300	0.	-0.043	0.079	0.576
2.400	0.	-0.034	0.065	0.583
2.500	0.	-0.026	0.054	0.586
2.600	0.	-0.021	0.045	0.587
2.700	0.	-0.018	0.037	0.586
2.800	0.	-0.012	0.031	0.582
2.900	0.	-0.010	0.026	0.577
3.000	0.	-0.008	0.021	0.569
3.200	0.	-0.005	0.015	0.551
3.400	0.	-0.003	0.010	0.528
3.600	0.	-0.002	0.007	0.503
3.800	0.	-0.001	0.005	0.475
4.000	0.	-0.001	0.004	0.447
4.200	0.	0.	0.003	0.419
4.400	0.	0.	0.002	0.390
4.600	0.	0.	0.001	0.362
4.800	0.	0.	0.001	0.335
5.000	0.	0.	0.001	0.309
5.200	0.	0.	0.001	0.285
5.400	0.	0.	0.	0.261
5.600	0.	0.	0.	0.239
5.800	0.	0.	0.	0.219
6.000	0.	0.	0.	0.200
6.200	0.	0.	0.	0.182
6.400	0.	0.	0.	0.165
6.600	0.	0.	0.	0.150
6.800	0.	0.	0.	0.136
7.000	0.	0.	0.	0.123
7.200	0.	0.	0.	0.111
7.400	0.	0.	0.	0.100
7.600	0.	0.	0.	0.091

r	1s	2s	2p	3s	r	1s	2s	2p	3s
7.800	0.	-0.	0.	0.082	0.550	0.090	-1.246	1.142	-0.236
8.000	0.	-0.	0.	0.073	0.600	0.058	-1.232	1.115	-0.215
8.200	0.	-0.	0.	0.066	0.650	0.038	-1.197	1.078	-0.187
8.400	0.	-0.	0.	0.059	0.700	0.025	-1.149	1.035	-0.154
8.600	0.	-0.	0.	0.053	0.750	0.016	-1.090	0.987	-0.117
8.800	0.	-0.	0.	0.048	0.800	0.011	-1.026	0.936	-0.078
9.000	0.	-0.	0.	0.043	0.850	0.007	-0.958	0.884	-0.037
					0.900	0.005	-0.889	0.831	0.005
9.500	0.	-0.	0.	0.032	0.950	0.004	-0.821	0.779	0.047
10.000	0.	-0.	0.	0.024	1.000	0.003	-0.755	0.728	0.088
10.500	8.	-0.	0.	0.018					
11.000	0.	-0.	0.	0.014	1.100	0.001	-0.631	0.631	0.170
11.500	0.	-0.	0.	0.010	1.200	0.001	-0.521	0.542	0.246
12.000	0.	-0.	0.	0.008	1.300	0.001	-0.426	0.462	0.317
12.500	0.	-0.	0.	0.006	1.400	0.	-0.346	0.392	0.380
13.000	0.	.	0.	0.004	1.500	0.	-0.278	0.331	0.436
13.500	0.	.	0.	0.003	1.600	0.	-0.223	0.279	0.485
14.000	0.	.	0.	0.002	1.700	0.	-0.178	0.233	0.527
14.500	0.	.	0.	0.002	1.800	0.	-0.141	0.195	0.562
15.000	0.	.	0.	0.001	1.900	0.	-0.112	0.163	0.590
15.500	0.	.	0.	0.001	2.000	0.	-0.088	0.135	0.612
16.000	0.	.	0.	0.001	2.100	0.	-0.070	0.112	0.628
$\lambda$	98.1	7.53	4.57	0.506	2.200	0.	-0.055	0.093	0.639
$\langle r^{-2} \rangle$	270.	18.2	5.47	0.783	2.300	0.	-0.043	0.077	0.645
$\langle r^{-1} \rangle$	11.0	2.11	1.95	0.399	2.400	0.	-0.033	0.064	0.646
$\langle r \rangle$	0.131	0.690	0.685	3.25	2.500	0.	-0.026	0.053	0.644
$\langle r^2 \rangle$	0.023	0.571	0.597	12.4	2.600	0.	-0.020	0.043	0.639
					2.700	0.	-0.016	0.036	0.630
					2.800	0.	-0.012	0.029	0.620
					2.900	0.	-0.010	0.024	0.606
					3.000	0.	-0.007	0.020	0.592

**Mg<sup>+</sup> S**

r	1s	2s	2p	3s	r	1s	2s	2p	3s
0.001	0.079	0.020	0.	0.005	3.200	0.	-0.004	0.014	0.558
0.002	0.157	0.040	0.	0.009	3.400	0.	-0.003	0.009	0.520
					3.600	0.	-0.002	0.006	0.480
0.004	0.306	0.077	0.001	0.018	3.800	0.	-0.001	0.004	0.440
0.006	0.448	0.113	0.002	0.026	4.000	0.	-0.001	0.003	0.400
0.008	0.583	0.147	0.003	0.033	4.200	0.	-0.	0.002	0.361
0.010	0.712	0.180	0.005	0.041	4.400	0.	-0.	0.001	0.325
					4.600	0.	-0.	0.001	0.290
0.015	1.006	0.253	0.011	0.057	4.800	0.	-0.	0.001	0.258
0.020	1.264	0.317	0.018	0.072	5.000	0.	-0.	0.	0.229
0.025	1.488	0.372	0.028	0.084	5.200	0.	-0.	0.	0.202
0.030	1.683	0.419	0.039	0.095	5.400	0.	-0.	0.	0.178
0.035	1.850	0.458	0.052	0.104	5.600	0.	-0.	0.	0.156
0.040	1.993	0.490	0.066	0.111	5.800	0.	-0.	0.	0.136
0.050	2.213	0.535	0.097	0.121	6.000	0.	-0.	0.	0.119
0.060	2.360	0.557	0.132	0.126	6.200	0.	-0.	0.	0.103
0.070	2.447	0.561	0.170	0.126	6.400	0.	-0.	0.	0.089
0.080	2.487	0.549	0.210	0.123	6.600	0.	-0.	0.	0.077
0.090	2.489	0.524	0.252	0.117	6.800	0.	-0.	0.	0.067
0.100	2.461	0.488	0.295	0.108	7.000	0.	-0.	0.	0.058
					7.200	0.	-0.	0.	0.050
0.120	2.340	0.391	0.382	0.086	7.400	0.	-0.	0.	0.043
0.140	2.166	0.271	0.468	0.058	7.600	0.	-0.	0.	0.037
0.160	1.966	0.139	0.552	0.027	7.800	0.	-0.	0.	0.031
0.180	1.758	0.	0.632	-0.006	8.000	0.	-0.	0.	0.027
0.200	1.553	-0.138	0.706	-0.038	8.200	0.	-0.	0.	0.023
0.220	1.360	-0.273	0.775	-0.069	8.400	0.	-0.	0.	0.020
0.240	1.183	-0.402	0.838	-0.098	8.600	0.	-0.	0.	0.017
0.260	1.022	-0.523	0.895	-0.125	8.800	0.	-0.	0.	0.014
0.280	0.878	-0.634	0.945	-0.150	9.000	0.	-0.	0.	0.012
0.300	0.751	-0.736	0.989	-0.172					
					9.500	0.	-0.	0.	0.008
0.350	0.502	-0.844	1.074	-0.214	10.000	0.	-0.	0.	0.005
0.400	0.330	-1.091	1.127	-0.240	10.500	0.	-0.	0.	0.003
0.450	0.215	-1.185	1.152	-0.251	11.000	0.	-0.	0.	0.002
0.500	0.139	-1.233	1.155	-0.249	11.500	0.	-0.	0.	0.001
					12.000	0.	-0.	0.	0.001
					12.500	0.	-0.	0.	0.001
$\lambda$	98.7	8.17	5.21	1.08					

r	1s	2s	2p	3s
$\langle r^{-3} \rangle$	270.	18.2	5.48	1.05
$\langle r^{-1} \rangle$	11.6	2.11	1.95	0.455
$\langle r \rangle$	0.131	0.690	0.684	2.84
$\langle r^2 \rangle$	0.023	0.571	0.595	9.25

### Mg<sup>++</sup> 1S

r	1s	2s	2p
0.001	0.079	0.020	0.
0.002	0.157	0.040	0.
0.004	0.306	0.077	0.001
0.006	0.448	0.113	0.002
0.008	0.584	0.147	0.003
0.010	0.712	0.180	0.005
0.015	1.006	0.253	0.011
0.020	1.264	0.317	0.019
0.025	1.488	0.372	0.028
0.030	1.683	0.419	0.039
0.035	1.850	0.458	0.052
0.040	1.993	0.490	0.066
0.050	2.213	0.535	0.097
0.060	2.360	0.557	0.133
0.070	2.447	0.561	0.171
0.080	2.487	0.549	0.211
0.090	2.489	0.524	0.253
0.100	2.461	0.488	0.296
0.120	2.340	0.391	0.383
0.140	2.166	0.271	0.469
0.160	1.966	0.139	0.553
0.180	1.758	0.	0.633
0.200	1.553	-0.138	0.708
0.220	1.360	-0.273	0.777
0.240	1.183	-0.402	0.840
0.260	1.022	-0.523	0.897
0.280	0.878	-0.634	0.947
0.300	0.751	-0.735	0.991
0.350	0.502	-0.944	1.076
0.400	0.330	-1.091	1.129
0.450	0.215	-1.184	1.154
0.500	0.139	-1.233	1.157
0.550	0.090	-1.246	1.143
0.600	0.058	-1.232	1.116
0.650	0.038	-1.198	1.080
0.700	0.025	-1.149	1.036
0.750	0.016	-1.090	0.988
0.800	0.011	-1.026	0.937
0.850	0.007	-0.958	0.884
0.900	0.005	-0.890	0.831
0.950	0.004	-0.822	0.778
1.000	0.003	-0.755	0.727
1.100	0.001	-0.631	0.629
1.200	0.001	-0.521	0.540
1.300	0.001	-0.426	0.460
1.400	0.	-0.346	0.389
1.500	0.	-0.278	0.328
1.600	0.	-0.223	0.275
1.700	0.	-0.178	0.230
1.800	0.	-0.141	0.191
1.900	0.	-0.111	0.159
2.000	0.	-0.088	0.131
2.100	0.	-0.069	0.108
2.200	0.	-0.054	0.089
2.300	0.	-0.042	0.073
2.400	0.	-0.033	0.060
2.500	0.	-0.026	0.049

r	1s	2s	2p
2.600	0.	-0.020	0.040
2.700	0.	-0.015	0.033
2.800	0.	-0.012	0.027
2.900	0.	-0.009	0.022
3.000	0.	-0.007	0.018

3.200	0.	-0.004	0.012
3.400	0.	-0.003	0.008
3.600	0.	-0.001	0.005
3.800	0.	-0.001	0.003
4.000	0.	-0.001	0.002
4.200	0.	0.	0.001
4.400	0.	0.	0.001
4.600	0.	0.	0.001

λ	99.5	8.97	6.01
$\langle r^{-3} \rangle$	272.	18.4	5.50
$\langle r^{-1} \rangle$	11.6	2.11	1.96
$\langle r \rangle$	0.131	0.690	0.681
$\langle r^2 \rangle$	0.023	0.571	0.589

### Al<sup>3+</sup>P

r	1s	2s	2p	3s	3p
0.001	0.090	0.023	0.	0.005	0.
0.002	0.177	0.046	0.	0.011	0.
0.004	0.344	0.090	0.001	0.021	0.
0.006	0.503	0.131	0.002	0.030	0.
0.008	0.654	0.170	0.004	0.039	0.001
0.010	0.797	0.207	0.006	0.048	0.001
0.015	1.120	0.290	0.014	0.067	0.002
0.020	1.400	0.361	0.024	0.083	0.004
0.025	1.641	0.421	0.036	0.097	0.006
0.030	1.846	0.471	0.050	0.109	0.009
0.035	2.019	0.512	0.066	0.118	0.012
0.040	2.164	0.544	0.084	0.125	0.015
0.050	2.379	0.586	0.123	0.135	0.022
0.060	2.513	0.601	0.166	0.138	0.030
0.070	2.581	0.595	0.213	0.136	0.038
0.080	2.597	0.570	0.262	0.130	0.047
0.090	2.574	0.532	0.313	0.120	0.056
0.100	2.520	0.481	0.364	0.108	0.065
0.120	2.351	0.353	0.468	0.078	0.083
0.140	2.134	0.204	0.569	0.042	0.100
0.160	1.900	0.044	0.665	0.004	0.117
0.180	1.667	-0.118	0.754	-0.034	0.132
0.200	1.445	-0.276	0.836	-0.072	0.145
0.220	1.242	-0.427	0.910	-0.107	0.157
0.240	1.059	-0.567	0.976	-0.139	0.167
0.260	0.898	-0.696	1.033	-0.167	0.176
0.280	0.758	-0.811	1.083	-0.193	0.183
0.300	0.637	-0.913	1.124	-0.214	0.188
0.350	0.406	-1.112	1.197	-0.252	0.194
0.400	0.256	-1.237	1.232	-0.269	0.191
0.450	0.160	-1.302	1.236	-0.267	0.181
0.500	0.099	-1.319	1.217	-0.251	0.166
0.550	0.062	-1.300	1.180	-0.224	0.147
0.600	0.039	-1.255	1.131	-0.187	0.124
0.650	0.024	-1.193	1.075	-0.145	0.098
0.700	0.015	-1.120	1.012	-0.098	0.071
0.750	0.010	-1.041	0.948	-0.048	0.042
0.800	0.007	-0.959	0.882	0.003	0.012
0.850	0.004	-0.877	0.818	0.054	-0.018
0.900	0.003	-0.797	0.755	0.105	-0.048

r	1s	2s	2p	3s	3p
0.950	0.002	-0.721	0.694	0.155	-0.078
1.000	0.002	-0.649	0.636	0.203	-0.107
1.100	0.001	-0.521	0.530	0.293	-0.164
1.200	0.001	-0.413	0.438	0.374	-0.219
1.300	0.	-0.324	0.360	0.444	-0.269
1.400	0.	-0.252	0.293	0.503	-0.315
1.500	0.	-0.195	0.238	0.552	-0.357
1.600	0.	-0.150	0.193	0.591	-0.394
1.700	0.	-0.114	0.155	0.621	-0.427
1.800	0.	-0.087	0.125	0.643	-0.456
1.900	0.	-0.066	0.100	0.657	-0.481
2.000	0.	-0.050	0.080	0.665	-0.502
2.100	0.	-0.038	0.064	0.668	-0.519
2.200	0.	-0.029	0.051	0.665	-0.533
2.300	0.	-0.022	0.041	0.659	-0.543
2.400	0.	-0.016	0.033	0.649	-0.551
2.500	0.	-0.012	0.026	0.636	-0.556
2.600	0.	-0.009	0.021	0.621	-0.559
2.700	0.	-0.007	0.017	0.604	-0.560
2.800	-0.	-0.005	0.014	0.586	-0.559
2.900	-0.	-0.004	0.011	0.566	-0.556
3.000	-0.	-0.003	0.009	0.546	-0.551
3.200	-0.	-0.002	0.006	0.504	-0.530
3.400	-0.	-0.001	0.004	0.462	-0.522
3.600	-0.	-0.001	0.003	0.420	-0.502
3.800	-0.	0.	0.002	0.380	-0.480
4.000	-0.	0.	0.001	0.343	-0.457
4.200	-0.	0.	0.001	0.307	-0.432
4.400	-0.	0.	0.001	0.275	-0.408
4.600	-0.	0.	0.	0.245	-0.383
4.800	-0.	0.	0.	0.217	-0.359
5.000	-0.	0.	0.	0.193	-0.335
5.200	-0.	0.	0.	0.170	-0.312
5.400	-0.	0.	0.	0.150	-0.290
5.600	-0.	0.	0.	0.132	-0.269
5.800	-0.	0.	0.	0.116	-0.248
6.000	-0.	0.	0.	0.102	-0.229
6.200	-0.	0.	0.	0.090	-0.212
6.400	-0.	0.	0.	0.078	-0.195
6.600	-0.	0.	0.	0.069	-0.179
6.800	-0.	0.	0.	0.060	-0.164
7.000	-0.	0.	0.	0.052	-0.151
7.200	-0.	0.	0.	0.045	-0.138
7.400	-0.	0.	0.	0.040	-0.126
7.600	-0.	0.	0.	0.034	-0.115
7.800	-0.	0.	0.	0.030	-0.105
8.000	-0.	0.	0.	0.026	-0.096
8.200	-0.	0.	0.	0.023	-0.087
8.400	-0.	0.	0.	0.020	-0.079
8.600	-0.	0.	0.	0.017	-0.072
8.800	-0.	0.	0.	0.015	-0.066
9.000	-0.	0.	0.	0.013	-0.060
9.500	-0.	0.	0.	0.009	-0.047
10.000	-0.	0.	0.	0.006	-0.036
10.500	-0.	0.	0.	0.004	-0.028
11.000	-0.	0.	0.	0.003	-0.022
11.500	-0.	0.	0.	0.002	-0.017
12.000	-0.	0.	0.	0.001	-0.013
12.500	-0.	0.	0.	0.001	-0.010
13.000	-0.	0.	0.	0.001	-0.008
13.500	-0.	0.	0.	0.	-0.006
14.000	-0.	0.	0.	0.	-0.004
14.500	-0.	0.	0.	0.	-0.003
15.000	-0.	0.	0.	0.	-0.003
15.500	-0.	0.	0.	0.	-0.002
16.000	-0.	0.	0.	0.	-0.001

r	1s	2s	2p	3s	3p
16.500	-0.	-0.	0.	0.	-0.001
17.000	-0.	-0.	0.	0.	-0.001
17.500	-0.	-0.	0.	0.	-0.001
$\lambda$	117.	9.82	6.44	0.787	0.420
$\langle r^{-2} \rangle$	317.	22.6	6.92	1.35	0.308
$\langle r^{-1} \rangle$	12.6	2.35	2.21	0.507	0.379
$\langle r \rangle$	0.120	0.620	0.600	2.60	3.43
$\langle r^2 \rangle$	0.019	0.459	0.455	7.89	14.0

### Al<sup>+</sup> 1S

r	1s	2s	2p	3s
0.001	0.090	0.023	0.	0.006
0.002	0.177	0.046	0.	0.011
0.004	0.344	0.090	0.001	0.022
0.006	0.503	0.131	0.002	0.033
0.008	0.654	0.170	0.004	0.042
0.010	0.797	0.207	0.006	0.051
0.015	1.120	0.290	0.014	0.072
0.020	1.400	0.361	0.024	0.090
0.025	1.641	0.422	0.036	0.105
0.030	1.846	0.472	0.050	0.117
0.035	2.019	0.512	0.066	0.127
0.040	2.164	0.545	0.084	0.135
0.050	2.379	0.586	0.123	0.145
0.060	2.513	0.602	0.166	0.149
0.070	2.581	0.595	0.213	0.147
0.080	2.597	0.571	0.262	0.140
0.090	2.574	0.532	0.313	0.130
0.100	2.520	0.481	0.365	0.117
0.120	2.351	0.354	0.468	0.084
0.140	2.134	0.204	0.569	0.045
0.160	1.900	0.044	0.665	0.004
0.180	1.667	-0.118	0.755	-0.037
0.200	1.445	-0.277	0.837	-0.077
0.220	1.242	-0.428	0.911	-0.115
0.240	1.059	-0.568	0.976	-0.150
0.260	0.898	-0.696	1.034	-0.181
0.280	0.758	-0.812	1.083	-0.208
0.300	0.637	-0.914	1.125	-0.231
0.350	0.408	-1.113	1.198	-0.271
0.400	0.256	-1.238	1.232	-0.289
0.450	0.160	-1.303	1.236	-0.287
0.500	0.099	-1.320	1.217	-0.270
0.550	0.062	-1.301	1.180	-0.240
0.600	0.039	-1.256	1.132	-0.200
0.650	0.024	-1.193	1.075	-0.154
0.700	0.015	-1.120	1.012	-0.103
0.750	0.010	-1.040	0.948	-0.049
0.800	0.007	-0.958	0.882	0.006
0.850	0.004	-0.876	0.817	0.062
0.900	0.003	-0.797	0.754	0.117
0.950	0.002	-0.721	0.694	0.170
1.000	0.002	-0.649	0.636	0.222
1.100	0.001	-0.521	0.530	0.319
1.200	0.001	-0.413	0.438	0.405
1.300	0.	-0.324	0.360	0.480
1.400	0.	-0.252	0.293	0.542
1.500	0.	-0.195	0.238	0.593
1.600	0.	-0.150	0.193	0.632
1.700	0.	-0.114	0.155	0.662

r	1s	2s	2p	3s	r	1s	2s	2p	3s
1.800	0.	-0.087	0.125	0.682	0.025	1.041	0.422	0.036	0.116
1.900	0.	-0.066	0.100	0.694	0.030	1.846	0.472	0.050	0.130
2.000	0.	-0.050	0.080	0.699	0.035	2.019	0.512	0.066	0.141
2.100	0.	-0.037	0.064	0.698	0.040	2.164	0.545	0.084	0.150
2.200	0.	-0.028	0.051	0.692					
2.300	0.	-0.021	0.041	0.681	0.050	2.379	0.586	0.123	0.161
2.400	0.	-0.016	0.033	0.666	0.060	2.513	0.602	0.167	0.165
2.500	0.	-0.012	0.026	0.649	0.070	2.581	0.595	0.214	0.163
2.600	0.	-0.009	0.021	0.629	0.080	2.597	0.571	0.263	0.155
2.700	0.	-0.007	0.017	0.607	0.090	2.574	0.532	0.314	0.144
2.800	0.	-0.005	0.013	0.584	0.100	2.520	0.481	0.365	0.129
2.900	0.	-0.004	0.011	0.560					
3.000	0.	-0.003	0.009	0.535	0.120	2.351	0.354	0.469	0.093
					0.140	2.134	0.204	0.570	0.050
3.200	0.	-0.002	0.006	0.485	0.160	1.900	0.044	0.666	0.004
3.400	0.	-0.001	0.004	0.435	0.180	1.667	-0.118	0.756	-0.042
3.600	0.	0.	0.002	0.387	0.200	1.445	-0.277	0.838	-0.086
3.800	0.	0.	0.002	0.342	0.220	1.242	-0.428	0.913	-0.128
4.000	0.	0.	0.001	0.301	0.240	1.059	-0.568	0.978	-0.166
4.200	0.	0.	0.001	0.263	0.260	0.898	-0.696	1.036	-0.201
4.400	0.	0.	0.001	0.229	0.280	0.758	-0.812	1.085	-0.231
4.600	0.	0.	0.	0.198	0.300	0.637	-0.914	1.127	-0.256
4.800	0.	0.	0.	0.171					
5.000	0.	0.	0.	0.147	0.350	0.406	-1.113	1.200	-0.301
5.200	0.	0.	0.	0.126	0.400	0.256	-1.238	1.234	-0.320
5.400	0.	0.	0.	0.107	0.450	0.160	-1.303	1.238	-0.318
5.600	0.	0.	0.	0.092	0.500	0.099	-1.319	1.218	-0.297
5.800	0.	0.	0.	0.078	0.550	0.062	-1.301	1.181	-0.263
6.000	0.	0.	0.	0.066	0.600	0.039	-1.256	1.132	-0.219
6.200	0.	0.	0.	0.056	0.650	0.024	-1.193	1.075	-0.167
6.400	0.	0.	0.	0.047	0.700	0.015	-1.120	1.012	-0.110
6.600	0.	0.	0.	0.040	0.750	0.010	-1.040	0.947	-0.049
6.800	0.	0.	0.	0.033	0.800	0.007	-0.958	0.882	0.012
7.000	0.	0.	0.	0.028	0.850	0.004	-0.877	0.817	0.075
7.200	0.	0.	0.	0.023	0.900	0.003	-0.797	0.753	0.136
7.400	0.	0.	0.	0.020	0.950	0.002	-0.721	0.692	0.196
7.600	0.	0.	0.	0.016	1.000	0.002	-0.649	0.634	0.253
7.800	0.	0.	0.	0.014					
8.000	0.	0.	0.	0.011	1.100	0.001	-0.520	0.528	0.360
8.200	0.	0.	0.	0.010	1.200	0.001	-0.412	0.436	0.454
8.400	0.	0.	0.	0.008	1.300	0.	-0.323	0.357	0.534
8.600	0.	0.	0.	0.007	1.400	0.	-0.251	0.291	0.600
8.800	0.	0.	0.	0.005	1.500	0.	-0.194	0.235	0.652
9.000	0.	0.	0.	0.005	1.600	0.	-0.149	0.190	0.691
					1.700	0.	-0.113	0.152	0.719
9.500	0.	0.	0.	0.003	1.800	0.	-0.086	0.122	0.735
10.000	0.	0.	0.	0.002	1.900	0.	-0.065	0.097	0.742
10.500	0.	0.	0.	0.001	2.000	0.	-0.049	0.077	0.741
11.000	0.	0.	0.	0.001	2.100	0.	-0.037	0.062	0.732
					2.200	0.	-0.028	0.049	0.718
					2.300	0.	-0.021	0.039	0.699
$\lambda$	118.	10.4	7.06	4.30	2.400	0.	-0.016	0.031	0.676
$\langle r^{-2} \rangle$	317.	22.6	6.92	1.55	2.500	0.	-0.012	0.024	0.650
$\langle r^{-1} \rangle$	12.6	2.35	2.21	0.540	2.600	0.	-0.009	0.019	0.622
$\langle r^0 \rangle$	0.120	0.820	0.600	2.43	2.700	0.	-0.006	0.015	0.592
$\langle r^2 \rangle$	0.019	0.458	0.455	6.80	2.800	0.	-0.005	0.012	0.562
					2.900	0.	-0.004	0.009	0.531
					3.000	0.	-0.003	0.007	0.500
					3.200	0.	-0.001	0.005	0.439
					3.400	0.	-0.001	0.003	0.381
					3.600	0.	0.	0.002	0.327
					3.800	0.	0.	0.001	0.279
					4.000	0.	0.	0.001	0.236
					4.200	0.	0.	0.	0.198
					4.400	0.	0.	0.	0.166
					4.600	0.	0.	0.	0.138
					4.800	0.	0.	0.	0.114
					5.000	0.	0.	0.	0.094
					5.200	0.	0.	0.	0.077
					5.400	0.	0.	0.	0.063
					5.600	0.	0.	0.	0.051
					5.800	0.	0.	0.	0.042
					6.000	0.	0.	0.	0.034

Al <sup>++</sup> 3S				
r	1s	2s	2p	3s
0.001	0.090	0.023	0.	0.006
0.002	0.177	0.046	0.	0.013
0.004	0.344	0.090	0.001	0.025
0.006	0.503	0.131	0.002	0.036
0.008	0.654	0.170	0.004	0.047
0.010	0.797	0.207	0.006	0.057
0.015	1.120	0.290	0.014	0.080
0.020	1.400	0.361	0.024	0.100



r	1s	2s	2p	3s	r	1s	2s	2p	3s	3p
6.200	0.	-0.	0.	0.027	0.850	0.003	-0.780	0.733	0.178	-0.111
6.400	0.	-0.	0.	0.022	0.900	0.002	-0.694	0.663	0.241	-0.151
6.600	0.	-0.	0.	0.018	0.950	0.001	-0.615	0.598	0.301	-0.190
6.800	0.	-0.	0.	0.014	1.000	0.001	-0.542	0.537	0.358	-0.227
7.000	0.	-0.	0.	0.011						
7.200	0.	-0.	0.	0.009	1.100	0.001	-0.417	0.430	0.458	-0.297
7.400	0.	-0.	0.	0.007	1.200	0.	-0.317	0.341	0.541	-0.359
7.600	0.	-0.	0.	0.006	1.300	0.	-0.238	0.269	0.608	-0.413
7.800	0.	-0.	0.	0.005	1.400	0.	-0.178	0.211	0.659	-0.459
8.000	0.	-0.	0.	0.004	1.500	0.	-0.132	0.164	0.695	-0.497
8.200	0.	-0.	0.	0.003	1.600	0.	-0.097	0.128	0.719	-0.528
8.400	0.	-0.	0.	0.002	1.700	0.	-0.072	0.099	0.731	-0.553
8.600	0.	-0.	0.	0.002	1.800	0.	-0.052	0.076	0.735	-0.572
8.800	0.	-0.	0.	0.001	1.900	0.	-0.038	0.059	0.730	-0.586
9.000	0.	-0.	0.	0.001	2.000	0.	-0.028	0.046	0.719	-0.595
					2.100	0.	-0.020	0.035	0.703	-0.600
9.500	0.	-0.	0.	0.001	2.200	-0.	-0.015	0.027	0.683	-0.601
					2.300	-0.	-0.011	0.021	0.660	-0.599
$\lambda$	119.	11.3	7.94	2.06	2.400	-0.	-0.008	0.016	0.635	-0.595
$\langle r^{-2} \rangle$	317.	22.6	6.94	1.88	2.500	-0.	-0.006	0.013	0.608	-0.589
$\langle r^{-1} \rangle$	12.6	2.35	2.21	0.588	2.600	-0.	-0.004	0.010	0.580	-0.581
$\langle r \rangle$	0.120	0.620	0.598	2.24	2.700	-0.	-0.003	0.008	0.552	-0.571
$\langle r^2 \rangle$	0.019	0.458	0.451	5.70	2.800	-0.	-0.002	0.006	0.524	-0.560
					2.900	-0.	-0.002	0.005	0.495	-0.548
					3.000	-0.	-0.001	0.004	0.468	-0.535

**SI 'S**

r	1s	2s	2p	3s	3p	r	1s	2s	2p	3s	3p
0.001	0.100	0.027	0.	0.007	0.	3.200	-0.	-0.001	0.002	0.414	-0.508
0.002	0.198	0.053	0.	0.014	0.	3.400	-0.	-0.	0.001	0.365	-0.480
						3.600	-0.	-0.	0.001	0.319	-0.451
0.004	0.384	0.102	0.001	0.026	0.	3.800	-0.	-0.	0.001	0.278	-0.422
0.006	0.560	0.149	0.003	0.039	0.001	4.000	-0.	-0.	0.	0.241	-0.393
0.008	0.727	0.193	0.005	0.050	0.001	4.200	-0.	-0.	0.	0.208	-0.366
0.010	0.883	0.235	0.008	0.061	0.002	4.400	-0.	-0.	0.	0.180	-0.339
0.015	1.235	0.327	0.017	0.085	0.004	4.600	-0.	-0.	0.	0.155	-0.314
0.020	1.536	0.405	0.030	0.105	0.006	4.800	-0.	-0.	0.	0.133	-0.291
0.025	1.792	0.470	0.045	0.121	0.009	5.000	-0.	-0.	0.	0.114	-0.268
0.030	2.006	0.523	0.062	0.135	0.013	5.200	-0.	-0.	0.	0.097	-0.247
0.035	2.183	0.565	0.082	0.146	0.017	5.400	-0.	-0.	0.	0.083	-0.227
0.040	2.328	0.596	0.104	0.154	0.021	5.600	-0.	-0.	0.	0.071	-0.209
						5.800	-0.	-0.	0.	0.060	-0.191
0.050	2.535	0.632	0.152	0.163	0.031	6.000	-0.	-0.	0.	0.051	-0.175
0.060	2.651	0.638	0.204	0.164	0.041	6.200	-0.	-0.	0.	0.043	-0.161
0.070	2.696	0.620	0.261	0.158	0.053	6.400	-0.	-0.	0.	0.037	-0.147
0.080	2.687	0.581	0.319	0.148	0.065	6.600	-0.	-0.	0.	0.031	-0.134
0.090	2.638	0.527	0.379	0.133	0.077	6.800	-0.	-0.	0.	0.027	-0.122
0.100	2.558	0.460	0.440	0.115	0.089	7.000	-0.	-0.	0.	0.022	-0.112
						7.200	-0.	-0.	0.	0.019	-0.102
0.120	2.340	0.301	0.559	0.072	0.112	7.400	-0.	-0.	0.	0.016	-0.093
0.140	2.084	0.121	0.674	0.024	0.135	7.600	-0.	-0.	0.	0.014	-0.084
0.160	1.820	-0.065	0.781	-0.026	0.155	7.800	-0.	-0.	0.	0.012	-0.077
0.180	1.566	-0.249	0.879	-0.074	0.173	8.000	-0.	-0.	0.	0.010	-0.070
0.200	1.333	-0.425	0.966	-0.120	0.189	8.200	-0.	-0.	0.	0.008	-0.063
0.220	1.124	-0.588	1.043	-0.162	0.202	8.400	-0.	-0.	0.	0.007	-0.057
0.240	0.941	-0.736	1.109	-0.199	0.213	8.600	-0.	-0.	0.	0.006	-0.052
0.260	0.783	-0.868	1.165	-0.231	0.221	8.800	-0.	-0.	0.	0.005	-0.047
0.280	0.649	-0.983	1.211	-0.258	0.226	9.000	-0.	-0.	0.	0.004	-0.043
0.300	0.535	-1.082	1.247	-0.279	0.229						
						9.500	-0.	-0.	0.	0.003	-0.033
0.350	0.326	-1.261	1.302	-0.311	0.228	10.000	-0.	-0.	0.	0.002	-0.026
0.400	0.197	-1.357	1.313	-0.315	0.215	10.500	-0.	-0.	0.	0.001	-0.020
0.450	0.118	-1.388	1.293	-0.296	0.194	11.000	-0.	-0.	0.	0.001	-0.015
0.500	0.070	-1.370	1.248	-0.260	0.165	11.500	-0.	-0.	0.	0.001	-0.012
0.550	0.042	-1.318	1.188	-0.211	0.131	12.000	-0.	-0.	0.	0.	-0.009
0.600	0.025	-1.244	1.117	-0.154	0.094	12.500	-0.	-0.	0.	0.	-0.007
0.650	0.016	-1.157	1.041	-0.090	0.055	13.000	-0.	-0.	0.	0.	-0.005
0.700	0.010	-1.062	0.962	-0.023	0.014	13.500	-0.	-0.	0.	0.	-0.004
0.750	0.006	-0.966	0.883	0.045	-0.028	14.000	-0.	-0.	0.	0.	-0.003
0.800	0.004	-0.871	0.806	0.112	-0.070	14.500	-0.	-0.	0.	0.	-0.002
						15.000	-0.	-0.	0.	0.	-0.002
						15.500	-0.	-0.	0.	0.	-0.001
						16.000	-0.	-0.	0.	0.	-0.001
						16.500	-0.	-0.	0.	0.	-0.001
						17.000	-0.	-0.	0.	0.	-0.001

$r$	$1s$	$2s$	$2p$	$3s$	$3p$
$\lambda$	138.	12.4	8.58	1.12	0.422
$\langle r^{-2} \rangle$	369.	27.4	8.52	2.02	0.458
$\langle r^{-1} \rangle$	13.6	2.59	2.46	0.608	0.454
$\langle r \rangle$	0.111	0.563	0.535	2.19	2.95
$\langle r^2 \rangle$	0.017	0.377	0.359	5.50	10.6

$r$	$1s$	$2s$	$2p$	$3s$	$3p$
2.300	-0.	-0.011	0.021	0.660	-0.629
2.400	-0.	-0.008	0.016	0.636	-0.623
2.500	-0.	-0.006	0.013	0.610	-0.615
2.600	-0.	-0.004	0.010	0.583	-0.604
2.700	-0.	-0.003	0.008	0.555	-0.592
2.800	-0.	-0.002	0.006	0.527	-0.578
2.900	-0.	-0.002	0.005	0.499	-0.563
3.000	-0.	-0.001	0.004	0.472	-0.548

**Sl 1P**

$r$	$1s$	$2s$	$2p$	$3s$	$3p$
0.001	0.100	0.027	0.	0.007	0.
0.002	0.198	0.053	0.	0.013	0.
0.004	0.384	0.102	0.001	0.026	0.
0.006	0.560	0.149	0.003	0.038	0.001
0.008	0.727	0.193	0.005	0.049	0.001
0.010	0.883	0.235	0.008	0.060	0.002
0.015	1.235	0.327	0.017	0.084	0.004
0.020	1.536	0.405	0.030	0.104	0.006
0.025	1.792	0.470	0.045	0.120	0.010
0.030	2.006	0.523	0.062	0.134	0.013
0.035	2.183	0.564	0.082	0.144	0.017
0.040	2.328	0.596	0.104	0.152	0.022
0.050	2.535	0.632	0.152	0.161	0.032
0.060	2.651	0.638	0.204	0.162	0.043
0.070	2.698	0.620	0.261	0.157	0.055
0.080	2.687	0.581	0.319	0.140	0.068
0.090	2.638	0.527	0.379	0.132	0.080
0.100	2.558	0.460	0.440	0.114	0.093
0.120	2.340	0.301	0.559	0.071	0.118
0.140	2.084	0.121	0.674	0.023	0.141
0.160	1.820	-0.065	0.781	-0.026	0.163
0.180	1.566	-0.249	0.879	-0.074	0.182
0.200	1.333	-0.425	0.966	-0.119	0.198
0.220	1.124	-0.588	1.043	-0.160	0.212
0.240	0.941	-0.736	1.109	-0.197	0.223
0.260	0.783	-0.868	1.165	-0.229	0.232
0.280	0.649	-0.983	1.210	-0.255	0.237
0.300	0.535	-1.081	1.247	-0.276	0.241
0.350	0.326	-1.261	1.302	-0.308	0.240
0.400	0.197	-1.357	1.313	-0.312	0.227
0.450	0.118	-1.388	1.293	-0.294	0.204
0.500	0.070	-1.370	1.248	-0.258	0.175
0.550	0.042	-1.318	1.188	-0.210	0.140
0.600	0.025	-1.244	1.117	-0.153	0.101
0.650	0.016	-1.157	1.041	-0.090	0.060
0.700	0.010	-1.062	0.962	-0.024	0.017
0.750	0.006	-0.966	0.883	0.043	-0.026
0.800	0.004	-0.871	0.807	0.110	-0.070
0.850	0.003	-0.780	0.733	0.175	-0.113
0.900	0.002	-0.695	0.663	0.238	-0.155
0.950	0.001	-0.615	0.598	0.298	-0.195
1.000	0.001	-0.542	0.537	0.353	-0.235

3.200	-0.	-0.001	0.002	0.410	-0.514
3.400	-0.	-0.	0.001	0.370	-0.479
3.600	-0.	-0.	0.001	0.324	-0.443
3.800	-0.	-0.	0.001	0.283	-0.408
4.000	-0.	-0.	0.	0.246	-0.374
4.200	-0.	-0.	0.	0.213	-0.342
4.400	-0.	-0.	0.	0.184	-0.311
4.600	-0.	-0.	0.	0.159	-0.282
4.800	-0.	-0.	0.	0.136	-0.255
5.000	-0.	-0.	0.	0.117	-0.230
5.200	-0.	-0.	0.	0.100	-0.207
5.400	-0.	-0.	0.	0.085	-0.188
5.600	-0.	-0.	0.	0.073	-0.167
5.800	-0.	-0.	0.	0.062	-0.149
6.000	-0.	-0.	0.	0.053	-0.134
6.200	-0.	-0.	0.	0.045	-0.119
6.400	-0.	-0.	0.	0.038	-0.108
6.600	-0.	-0.	0.	0.032	-0.095
6.800	-0.	-0.	0.	0.027	-0.084
7.000	-0.	-0.	0.	0.023	-0.075
7.200	-0.	-0.	0.	0.019	-0.066
7.400	-0.	-0.	0.	0.016	-0.059
7.600	-0.	-0.	0.	0.014	-0.052
7.800	-0.	-0.	0.	0.012	-0.046
8.000	-0.	-0.	0.	0.010	-0.041
8.200	-0.	-0.	0.	0.008	-0.036
8.400	-0.	-0.	0.	0.007	-0.032
8.600	-0.	-0.	0.	0.006	-0.028
8.800	-0.	-0.	0.	0.005	-0.025
9.000	-0.	-0.	0.	0.004	-0.022

9.500	-0.	-0.	0.	0.003	-0.016
10.000	-0.	-0.	0.	0.002	-0.011
10.500	-0.	-0.	0.	0.001	-0.008
11.000	-0.	-0.	0.	0.001	-0.006
11.500	-0.	-0.	0.	0.	-0.004
12.000	-0.	-0.	0.	0.	-0.003
12.500	-0.	-0.	0.	0.	-0.002
13.000	-0.	-0.	0.	0.	-0.002
13.500	-0.	-0.	0.	0.	-0.001
14.000	-0.	-0.	0.	0.	-0.001
14.500	-0.	-0.	0.	0.	-0.001

$r$	$1s$	$2s$	$2p$	$3s$	$3p$
$\lambda$	138.	12.3	8.51	1.08	0.594
$\langle r^{-2} \rangle$	369.	27.4	8.52	1.98	0.498
$\langle r^{-1} \rangle$	13.6	2.59	2.46	0.603	0.477
$\langle r \rangle$	0.111	0.563	0.535	2.21	2.75
$\langle r^2 \rangle$	0.017	0.377	0.360	5.68	8.98

**Sl 1D**

$r$	$1s$	$2s$	$2p$	$3s$	$3p$
0.001	0.100	0.027	0.	0.007	0.
0.002	0.198	0.053	0.	0.014	0.
0.004	0.384	0.102	0.001	0.026	0.
0.006	0.560	0.149	0.003	0.038	0.001
0.008	0.727	0.193	0.005	0.049	0.001
0.010	0.883	0.235	0.008	0.060	0.002
0.015	1.235	0.327	0.017	0.084	0.004



r	1s	2s	2p	3s	3p
0.500	0.070	-1.371	1.248	-0.272	0.195
0.550	0.042	-1.319	1.188	-0.220	0.155
0.600	0.025	-1.244	1.117	-0.159	0.111
0.650	0.016	-1.157	1.041	-0.092	0.063
0.700	0.010	-1.062	0.962	-0.022	0.015
0.750	0.006	-0.965	0.883	0.049	-0.035
0.800	0.004	-0.871	0.806	0.120	-0.084
0.850	0.003	-0.779	0.733	0.190	-0.133
0.900	0.002	-0.694	0.663	0.256	-0.181
0.950	0.001	-0.614	0.597	0.319	-0.227
1.000	0.001	-0.542	0.537	0.378	-0.271
1.100	0.001	-0.416	0.430	0.483	-0.353
1.200	0.	-0.316	0.341	0.569	-0.426
1.300	0.	-0.238	0.289	0.637	-0.489
1.400	0.	-0.177	0.210	0.689	-0.542
1.500	0.	-0.131	0.164	0.724	-0.585
1.600	0.	-0.097	0.127	0.747	-0.619
1.700	0.	-0.071	0.099	0.757	-0.645
1.800	0.	-0.052	0.076	0.758	-0.663
1.900	0.	-0.038	0.059	0.750	-0.674
2.000	0.	-0.028	0.045	0.735	-0.679
2.100	0.	-0.020	0.035	0.715	-0.678
2.200	0.	-0.015	0.027	0.691	-0.673
2.300	-0.	-0.011	0.021	0.664	-0.664
2.400	-0.	-0.008	0.016	0.634	-0.652
2.500	-0.	-0.006	0.012	0.603	-0.637
2.600	-0.	-0.004	0.010	0.572	-0.620
2.700	-0.	-0.003	0.007	0.540	-0.600
2.800	-0.	-0.002	0.006	0.508	-0.580
2.900	-0.	-0.002	0.005	0.477	-0.558
3.000	-0.	-0.001	0.004	0.446	-0.536
3.200	-0.	-0.001	0.002	0.388	-0.490
3.400	-0.	-0.	0.001	0.334	-0.444
3.600	-0.	-0.	0.001	0.286	-0.400
3.800	-0.	-0.	0.001	0.243	-0.357
4.000	-0.	-0.	0.	0.206	-0.317
4.200	-0.	-0.	0.	0.173	-0.280
4.400	-0.	-0.	0.	0.145	-0.247
4.600	-0.	-0.	0.	0.121	-0.216
4.800	-0.	-0.	0.	0.101	-0.188
5.000	-0.	-0.	0.	0.083	-0.164
5.200	-0.	-0.	0.	0.069	-0.142
5.400	-0.	-0.	0.	0.057	-0.123
5.600	-0.	-0.	0.	0.047	-0.106
5.800	-0.	-0.	0.	0.038	-0.091
6.000	-0.	-0.	0.	0.031	-0.078
6.200	-0.	-0.	0.	0.026	-0.067
6.400	-0.	-0.	0.	0.021	-0.057
6.600	-0.	-0.	0.	0.017	-0.049
6.800	-0.	-0.	0.	0.014	-0.041
7.000	-0.	-0.	0.	0.011	-0.035
7.200	-0.	-0.	0.	0.009	-0.030
7.400	-0.	-0.	0.	0.007	-0.025
7.600	-0.	-0.	0.	0.006	-0.021
7.800	-0.	-0.	0.	0.005	-0.018
8.000	-0.	-0.	0.	0.004	-0.015
8.200	-0.	-0.	0.	0.003	-0.013
8.400	-0.	-0.	0.	0.003	-0.011
8.600	-0.	-0.	0.	0.002	-0.009
8.800	-0.	-0.	0.	0.002	-0.008
9.000	-0.	-0.	0.	0.001	-0.006
9.500	-0.	-0.	0.	0.001	-0.004
10.000	-0.	-0.	0.	0.	-0.003
10.500	-0.	-0.	0.	0.	-0.002
11.000	-0.	-0.	0.	0.	-0.001
11.500	-0.	-0.	0.	0.	-0.001
$\lambda$	138.	13.0	9.22	1.68	1.17
$\langle r^{-2} \rangle$	369.	27.5	8.52	2.21	0.610
$\langle r^{-1} \rangle$	13.6	2.59	2.46	0.635	0.528

r	1s	2s	2p	3s	3p
$\langle r \rangle$	0.111	0.583	0.535	2.09	2.47
$\langle r^2 \rangle$	0.017	0.377	0.359	5.04	7.10
<b>SI<sup>++</sup> 1S</b>					
r	1s	2s	2p	3s	3p
0.001	0.100	0.027	0.	0.008	
0.002	0.198	0.053	0.	0.015	
0.004	0.384	0.102	0.001	0.030	
0.006	0.560	0.149	0.003	0.043	
0.008	0.727	0.193	0.005	0.056	
0.010	0.883	0.235	0.008	0.068	
0.015	1.230	0.328	0.017	0.095	
0.020	1.537	0.406	0.030	0.117	
0.025	1.792	0.471	0.045	0.136	
0.030	2.006	0.524	0.062	0.151	
0.035	2.183	0.565	0.082	0.163	
0.040	2.329	0.597	0.104	0.172	
0.050	2.535	0.633	0.152	0.182	
0.060	2.651	0.639	0.205	0.183	
0.070	2.696	0.621	0.261	0.177	
0.080	2.687	0.582	0.320	0.165	
0.090	2.638	0.528	0.380	0.148	
0.100	2.558	0.461	0.440	0.128	
0.120	2.340	0.301	0.560	0.080	
0.140	2.084	0.121	0.675	0.026	
0.160	1.820	-0.068	0.782	-0.029	
0.180	1.566	-0.250	0.880	-0.084	
0.200	1.332	-0.426	0.968	-0.135	
0.220	1.124	-0.589	1.044	-0.181	
0.240	0.941	-0.738	1.110	-0.223	
0.260	0.783	-0.870	1.166	-0.258	
0.280	0.648	-0.985	1.212	-0.288	
0.300	0.535	-1.084	1.248	-0.312	
0.350	0.326	-1.263	1.303	-0.347	
0.400	0.197	-1.359	1.314	-0.350	
0.450	0.118	-1.389	1.293	-0.329	
0.500	0.070	-1.371	1.249	-0.287	
0.550	0.042	-1.319	1.188	-0.232	
0.600	0.025	-1.244	1.117	-0.166	
0.650	0.016	-1.157	1.041	-0.094	
0.700	0.010	-1.062	0.962	-0.019	
0.750	0.006	-0.965	0.883	0.058	
0.800	0.004	-0.871	0.806	0.134	
0.850	0.003	-0.779	0.732	0.207	
0.900	0.002	-0.694	0.662	0.278	
0.950	0.001	-0.614	0.596	0.345	
1.000	0.001	-0.540	0.536	0.407	
1.100	0.001	-0.415	0.429	0.517	
1.200	0.	-0.315	0.340	0.607	
1.300	0.	-0.236	0.267	0.676	
1.400	0.	-0.176	0.209	0.727	
1.500	0.	-0.130	0.163	0.761	
1.600	0.	-0.096	0.126	0.780	
1.700	0.	-0.070	0.098	0.787	
1.800	0.	-0.051	0.075	0.782	
1.900	0.	-0.037	0.058	0.769	
2.000	0.	-0.027	0.045	0.748	
2.100	0.	-0.019	0.034	0.722	
2.200	0.	-0.014	0.026	0.692	
2.300	0.	-0.010	0.020	0.659	
2.400	0.	-0.007	0.016	0.624	
2.500	0.	-0.005	0.012	0.587	
2.600	0.	-0.004	0.009	0.551	
2.700	0.	-0.003	0.007	0.514	

r	1s	2s	2p	3s	r	1s	2s	2p	3s	3p
2.800	0.	-0.002	0.005	0.479	0.200	1.219	-0.580	1.093	-0.171	0.248
2.900	0.	-0.001	0.004	0.444	0.220	1.009	-0.751	1.170	-0.217	0.262
3.000	0.	-0.001	0.003	0.410	0.240	0.829	-0.903	1.234	-0.256	0.272
					0.260	0.677	-1.034	1.286	-0.288	0.279
3.200	0.	-0.	0.002	0.348	0.280	0.551	-1.145	1.325	-0.313	0.282
3.400	0.	-0.	0.001	0.292	0.300	0.446	-1.236	1.354	-0.331	0.282
3.600	0.	-0.	0.001	0.243						
3.800	0.	-0.	0.	0.200	0.350	0.260	-1.388	1.385	-0.350	0.269
4.000	0.	-0.	0.	0.164	0.400	0.150	-1.449	1.370	-0.336	0.242
4.200	0.	-0.	0.	0.134	0.450	0.086	-1.443	1.322	-0.296	0.203
4.400	0.	-0.	0.	0.109	0.500	0.050	-1.389	1.252	-0.238	0.157
4.600	0.	-0.	0.	0.088	0.550	0.029	-1.306	1.169	-0.167	0.104
4.800	0.	-0.	0.	0.071	0.600	0.017	-1.205	1.078	-0.088	0.049
5.000	0.	-0.	0.	0.057	0.650	0.010	-1.095	0.984	-0.006	-0.008
5.200	0.	-0.	0.	0.045	0.700	0.006	-0.984	0.892	0.078	-0.065
5.400	0.	-0.	0.	0.036	0.750	0.004	-0.876	0.803	0.160	-0.122
5.600	0.	-0.	0.	0.028	0.800	0.002	-0.773	0.718	0.239	-0.178
5.800	0.	-0.	0.	0.023	0.850	0.002	-0.678	0.640	0.314	-0.231
6.000	0.	-0.	0.	0.018	0.900	0.001	-0.591	0.567	0.383	-0.282
6.200	0.	-0.	0.	0.014	0.950	0.001	-0.512	0.501	0.447	-0.330
6.400	0.	0.	0.	0.011	1.000	0.001	-0.442	0.441	0.505	-0.375
6.600	0.	0.	0.	0.009						
6.800	0.	0.	0.	0.007	1.100	0.	-0.326	0.339	0.603	-0.455
7.000	0.	0.	0.	0.005	1.200	0.	-0.238	0.258	0.677	-0.522
7.200	0.	0.	0.	0.004	1.300	0.	-0.172	0.196	0.730	-0.577
7.400	0.	0.	0.	0.003	1.400	0.	-0.123	0.147	0.763	-0.619
7.600	0.	0.	0.	0.002	1.500	0.	-0.088	0.110	0.781	-0.651
7.800	0.	0.	0.	0.002	1.600	0.	-0.062	0.083	0.785	-0.672
8.000	0.	0.	0.	0.001	1.700	0.	-0.044	0.062	0.778	-0.686
8.200	0.	0.	0.	0.001	1.800	-0.	-0.031	0.046	0.763	-0.692
8.400	0.	0.	0.	0.001	1.900	-0.	-0.022	0.034	0.741	-0.691
8.600	0.	0.	0.	0.001	2.000	-0.	-0.016	0.026	0.715	-0.686
8.800	0.	0.	0.	0.001	2.100	-0.	-0.011	0.019	0.684	-0.676
					2.200	-0.	-0.008	0.014	0.652	-0.662
					2.300	-0.	-0.006	0.011	0.618	-0.645
					2.400	-0.	-0.004	0.008	0.583	-0.627
					2.500	-0.	-0.003	0.006	0.549	-0.606
					2.600	-0.	-0.002	0.005	0.514	-0.585
					2.700	-0.	-0.002	0.004	0.481	-0.562
					2.800	-0.	-0.001	0.003	0.449	-0.539
					2.900	-0.	-0.001	0.002	0.418	-0.515
					3.000	-0.	-0.001	0.002	0.388	-0.492

$\lambda$	139.	13.9	10.1	2.36
$\langle r^{-1} \rangle$	369.	27.5	8.54	2.48
$\langle r^{-2} \rangle$	13.6	2.60	2.46	0.669
$\langle r^{-3} \rangle$	0.111	0.582	0.535	1.99
$\langle r^{-4} \rangle$	0.017	0.376	0.358	4.51

**P 'S**

r	1s	2s	2p	3s	3p	r	1s	2s	2p	3s	3p
0.001	0.111	0.030	0.	0.008	0.	3.200	-0.	-0.	0.001	0.333	-0.446
0.002	0.219	0.059	0.	0.016	0.	3.400	-0.	-0.	0.001	0.284	-0.402
						3.600	-0.	-0.	0.	0.241	-0.360
						3.800	-0.	-0.	0.	0.204	-0.321
						4.000	-0.	-0.	0.	0.172	-0.285
						4.200	-0.	-0.	0.	0.144	-0.252
						4.400	-0.	-0.	0.	0.121	-0.222
						4.600	-0.	-0.	0.	0.101	-0.196
						4.800	-0.	-0.	0.	0.084	-0.172
						5.000	-0.	-0.	0.	0.070	-0.150
0.004	0.425	0.115	0.002	0.032	0.	5.200	-0.	-0.	0.	0.058	-0.131
0.006	0.819	0.168	0.004	0.048	0.001	5.400	-0.	-0.	0.	0.048	-0.115
0.008	0.801	0.217	0.006	0.060	0.002	5.600	-0.	-0.	0.	0.040	-0.100
0.010	0.971	0.283	0.010	0.072	0.002	5.800	-0.	-0.	0.	0.033	-0.087
						6.000	-0.	-0.	0.	0.027	-0.075
0.015	1.352	0.365	0.021	0.100	0.005	6.200	-0.	-0.	0.	0.022	-0.065
0.020	1.673	0.450	0.036	0.123	0.009	6.400	-0.	-0.	0.	0.018	-0.057
0.025	1.941	0.518	0.055	0.142	0.013	6.600	-0.	-0.	0.	0.015	-0.049
0.030	2.163	0.573	0.076	0.157	0.018	6.800	-0.	-0.	0.	0.012	-0.042
0.035	2.342	0.615	0.100	0.168	0.024	7.000	-0.	-0.	0.	0.010	-0.037
0.040	2.486	0.644	0.126	0.176	0.030	7.200	-0.	-0.	0.	0.008	-0.032
						7.400	-0.	-0.	0.	0.007	-0.027
0.050	2.680	0.674	0.183	0.184	0.043	7.600	-0.	-0.	0.	0.006	-0.024
0.060	2.775	0.668	0.246	0.182	0.058	7.800	-0.	-0.	0.	0.005	-0.020
0.070	2.795	0.636	0.312	0.172	0.074	8.000	-0.	-0.	0.	0.004	-0.017
0.080	2.759	0.581	0.381	0.156	0.090	8.200	-0.	-0.	0.	0.003	-0.015
0.090	2.681	0.510	0.450	0.135	0.106	8.400	-0.	-0.	0.	0.003	-0.013
0.100	2.575	0.426	0.519	0.111	0.122	8.600	-0.	-0.	0.	0.002	-0.011
						8.800	-0.	-0.	0.	0.002	-0.010
0.120	2.311	0.234	0.655	0.056	0.153	9.000	-0.	-0.	0.	0.001	-0.008
0.140	2.018	0.024	0.782	-0.003	0.182						
0.160	1.729	-0.187	0.899	-0.063	0.208						
0.180	1.460	-0.390	1.003	-0.119	0.229						

r	1s	2s	2p	3s	3p
9.500	-0.	-0.	0.	0.001	-0.006
10.000	-0.	-0.	0.	0.	-0.004
10.500	-0.	-0.	0.	0.	-0.003
11.000	-0.	-0.	0.	0.	-0.002
11.500	-0.	-0.	0.	0.	-0.001
12.000	-0.	-0.	0.	0.	-0.001
12.500	-0.	-0.	0.	0.	-0.001

$\lambda$	160.	15.0	10.8	1.39	0.784
$\langle r^{-2} \rangle$	424.	32.7	10.3	2.69	0.715
$\langle r^{-1} \rangle$	14.8	2.83	2.71	0.895	0.570
$\langle r \rangle$	0.104	0.516	0.483	1.93	2.32
$\langle r^2 \rangle$	0.014	0.316	0.292	4.35	6.39

### P P

r	1s	2s	2p	3s	3p
0.001	0.111	0.030	0.	0.008	0.
0.002	0.219	0.059	0.	0.016	0.
0.004	0.425	0.115	0.002	0.032	0.
0.006	0.619	0.168	0.004	0.046	0.001
0.008	0.801	0.217	0.006	0.060	0.001
0.010	0.971	0.263	0.010	0.073	0.002
0.015	1.352	0.365	0.021	0.101	0.005
0.020	1.673	0.450	0.036	0.124	0.008
0.025	1.941	0.519	0.055	0.143	0.013
0.030	2.163	0.573	0.076	0.158	0.018
0.035	2.342	0.615	0.100	0.169	0.023
0.040	2.486	0.645	0.126	0.177	0.029
0.050	2.680	0.674	0.183	0.185	0.042
0.060	2.775	0.668	0.246	0.183	0.057
0.070	2.795	0.636	0.312	0.173	0.072
0.080	2.739	0.582	0.381	0.157	0.088
0.090	2.681	0.510	0.450	0.136	0.104
0.100	2.575	0.427	0.519	0.112	0.119
0.120	2.311	0.234	0.655	0.056	0.150
0.140	2.018	0.024	0.783	-0.003	0.178
0.160	1.729	-0.187	0.899	-0.063	0.203
0.180	1.460	-0.391	1.003	-0.120	0.224
0.200	1.219	-0.580	1.094	-0.172	0.242
0.220	1.009	-0.751	1.171	-0.218	0.256
0.240	0.829	-0.903	1.234	-0.257	0.266
0.260	0.677	-1.034	1.286	-0.290	0.272
0.280	0.551	-1.145	1.325	-0.315	0.275
0.300	0.446	-1.237	1.354	-0.333	0.275
0.350	0.260	-1.388	1.385	-0.352	0.263
0.400	0.150	-1.449	1.370	-0.338	0.235
0.450	0.086	-1.443	1.322	-0.297	0.197
0.500	0.030	-1.389	1.252	-0.239	0.152
0.550	0.029	-1.306	1.169	-0.167	0.100
0.600	0.017	-1.205	1.078	-0.088	0.046
0.650	0.010	-1.095	0.984	-0.005	-0.010
0.700	0.006	-0.984	0.892	0.079	-0.066
0.750	0.004	-0.876	0.803	0.161	-0.122
0.800	0.002	-0.773	0.718	0.241	-0.176
0.850	0.002	-0.678	0.640	0.316	-0.228
0.900	0.001	-0.591	0.567	0.386	-0.278
0.950	0.001	-0.512	0.501	0.450	-0.325
1.000	0.001	-0.442	0.441	0.508	-0.368
1.100	0.	-0.326	0.339	0.606	-0.446
1.200	0.	-0.238	0.258	0.681	-0.511
1.300	0.	-0.172	0.196	0.733	-0.564

r	1s	2s	2p	3s	3p
1.400	0.	-0.123	0.147	0.767	-0.604
1.500	0.	-0.088	0.110	0.784	-0.635
1.600	0.	-0.062	0.082	0.788	-0.656
1.700	0.	-0.044	0.062	0.780	-0.669
1.800	-0.	-0.031	0.046	0.764	-0.675
1.900	-0.	-0.022	0.034	0.742	-0.675
2.000	-0.	-0.016	0.025	0.715	-0.670
2.100	-0.	-0.011	0.019	0.684	-0.661
2.200	-0.	-0.008	0.014	0.651	-0.649
2.300	-0.	-0.006	0.011	0.616	-0.634
2.400	-0.	-0.004	0.008	0.581	-0.617
2.500	-0.	-0.003	0.006	0.546	-0.599
2.600	-0.	-0.002	0.005	0.512	-0.580
2.700	-0.	-0.002	0.004	0.478	-0.559
2.800	-0.	-0.001	0.003	0.445	-0.539
2.900	-0.	-0.001	0.002	0.414	-0.517
3.000	-0.	-0.001	0.002	0.384	-0.496

3.200	-0.	-0.	0.001	0.329	-0.454
3.400	-0.	-0.	0.001	0.281	-0.414
3.600	-0.	-0.	0.	0.238	-0.375
3.800	-0.	-0.	0.	0.201	-0.339
4.000	-0.	-0.	0.	0.169	-0.305
4.200	-0.	-0.	0.	0.142	-0.274
4.400	-0.	-0.	0.	0.119	-0.245
4.600	-0.	-0.	0.	0.099	-0.219
4.800	-0.	-0.	0.	0.083	-0.195
5.000	-0.	-0.	0.	0.069	-0.173
5.200	-0.	-0.	0.	0.057	-0.154
5.400	-0.	-0.	0.	0.047	-0.137
5.600	-0.	-0.	0.	0.039	-0.121
5.800	-0.	-0.	0.	0.032	-0.107
6.000	-0.	-0.	0.	0.027	-0.095
6.200	-0.	-0.	0.	0.022	-0.083
6.400	-0.	-0.	0.	0.018	-0.074
6.600	-0.	-0.	0.	0.015	-0.065
6.800	-0.	-0.	0.	0.012	-0.057
7.000	-0.	-0.	0.	0.010	-0.050
7.200	-0.	-0.	0.	0.008	-0.044
7.400	-0.	-0.	0.	0.007	-0.039
7.600	-0.	-0.	0.	0.006	-0.034
7.800	-0.	-0.	0.	0.005	-0.030
8.000	-0.	-0.	0.	0.004	-0.026
8.200	-0.	-0.	0.	0.003	-0.023
8.400	-0.	-0.	0.	0.003	-0.020
8.600	-0.	-0.	0.	0.002	-0.017
8.800	-0.	-0.	0.	0.002	-0.015
9.000	-0.	-0.	0.	0.001	-0.013

9.500	-0.	-0.	0.	0.001	-0.009
10.000	-0.	-0.	0.	0.001	-0.007
10.500	-0.	-0.	0.	0.	-0.005
11.000	-0.	-0.	0.	0.	-0.003
11.500	-0.	-0.	0.	0.	-0.002
12.000	-0.	-0.	0.	0.	-0.002
12.500	-0.	-0.	0.	0.	-0.001
13.000	-0.	-0.	0.	0.	-0.001
13.500	-0.	-0.	0.	0.	-0.001

$\lambda$	160.	15.1	10.9	1.43	0.649
$\langle r^{-2} \rangle$	424.	32.7	10.3	2.72	0.687
$\langle r^{-1} \rangle$	14.6	2.83	2.71	0.698	0.556
$\langle r \rangle$	0.104	0.516	0.483	1.92	2.40
$\langle r^2 \rangle$	0.014	0.316	0.292	4.31	6.92

**P<sup>2</sup> D**

r	1s	2s	2p	3s	3p
0.001	0.111	0.030	0.	0.008	0.
0.002	0.219	0.059	0.	0.016	0.
0.004	0.425	0.115	0.002	0.032	0.
0.006	0.619	0.168	0.004	0.046	0.001
0.008	0.801	0.217	0.006	0.060	0.001
0.010	0.971	0.263	0.010	0.073	0.002
0.015	1.352	0.365	0.021	0.101	0.005
0.020	1.673	0.450	0.036	0.124	0.009
0.025	1.941	0.519	0.055	0.143	0.013
0.030	2.163	0.573	0.076	0.158	0.018
0.035	2.342	0.615	0.100	0.169	0.023
0.040	2.486	0.645	0.126	0.177	0.029
0.050	2.680	0.674	0.183	0.184	0.043
0.060	2.775	0.668	0.246	0.182	0.057
0.070	2.795	0.636	0.312	0.172	0.073
0.080	2.759	0.581	0.381	0.157	0.089
0.090	2.681	0.510	0.450	0.130	0.105
0.100	2.575	0.427	0.519	0.112	0.121
0.120	2.311	0.234	0.655	0.056	0.151
0.140	2.018	0.024	0.783	-0.003	0.180
0.160	1.729	-0.187	0.899	-0.063	0.205
0.180	1.460	-0.391	1.003	-0.120	0.226
0.200	1.219	-0.580	1.094	-0.172	0.244
0.220	1.009	-0.751	1.171	-0.218	0.258
0.240	0.829	-0.903	1.234	-0.257	0.268
0.260	0.677	-1.034	1.286	-0.289	0.275
0.280	0.551	-1.145	1.325	-0.314	0.278
0.300	0.446	-1.237	1.354	-0.332	0.278
0.350	0.260	-1.388	1.385	-0.351	0.265
0.400	0.150	-1.449	1.370	-0.337	0.238
0.450	0.086	-1.443	1.322	-0.297	0.200
0.500	0.050	-1.389	1.252	-0.238	0.153
0.550	0.029	-1.306	1.169	-0.167	0.102
0.600	0.017	-1.205	1.078	-0.088	0.047
0.650	0.010	-1.095	0.984	-0.005	-0.009
0.700	0.006	-0.984	0.892	0.079	-0.066
0.750	0.004	-0.876	0.803	0.161	-0.122
0.800	0.002	-0.773	0.718	0.240	-0.177
0.850	0.002	-0.678	0.640	0.315	-0.229
0.900	0.001	-0.591	0.567	0.385	-0.280
0.950	0.001	-0.512	0.501	0.449	-0.327
1.000	0.001	-0.442	0.441	0.507	-0.371
1.100	0.	-0.326	0.339	0.605	-0.450
1.200	0.	-0.238	0.258	0.679	-0.516
1.300	0.	-0.172	0.196	0.732	-0.569
1.400	0.	-0.123	0.147	0.765	-0.610
1.500	0.	-0.088	0.110	0.783	-0.641
1.600	0.	-0.062	0.082	0.787	-0.662
1.700	0.	-0.044	0.062	0.780	-0.676
1.800	-0.	-0.031	0.046	0.764	-0.681
1.900	-0.	-0.022	0.034	0.742	-0.681
2.000	-0.	-0.016	0.026	0.715	-0.678
2.100	-0.	-0.011	0.019	0.684	-0.667
2.200	-0.	-0.008	0.014	0.651	-0.654
2.300	-0.	-0.006	0.011	0.617	-0.639
2.400	-0.	-0.004	0.008	0.582	-0.621
2.500	-0.	-0.003	0.006	0.547	-0.602
2.600	-0.	-0.002	0.005	0.513	-0.582
2.700	-0.	-0.002	0.004	0.479	-0.561
2.800	-0.	-0.001	0.003	0.447	-0.539
2.900	-0.	-0.001	0.002	0.416	-0.517
3.000	-0.	-0.001	0.002	0.386	-0.495
3.200	-0.	-0.	0.001	0.331	-0.451
3.400	-0.	-0.	0.001	0.282	-0.409
3.600	-0.	-0.	0.	0.239	-0.360

r	1s	2s	2p	3s	3p
3.800	-0.	-0.	0.	0.202	-0.332
4.000	-0.	-0.	0.	0.170	-0.297
4.200	-0.	-0.	0.	0.143	-0.265
4.400	-0.	-0.	0.	0.120	-0.236
4.600	-0.	-0.	0.	0.100	-0.209
4.800	-0.	-0.	0.	0.083	-0.186
5.000	-0.	-0.	0.	0.069	-0.164
5.200	-0.	-0.	0.	0.057	-0.145
5.400	-0.	-0.	0.	0.048	-0.128
5.600	-0.	-0.	0.	0.039	-0.112
5.800	-0.	-0.	0.	0.033	-0.099
6.000	-0.	-0.	0.	0.027	-0.087
6.200	-0.	-0.	0.	0.022	-0.076
6.400	-0.	-0.	0.	0.018	-0.066
6.600	-0.	-0.	0.	0.015	-0.058
6.800	-0.	-0.	0.	0.012	-0.051
7.000	-0.	-0.	0.	0.010	-0.044
7.200	-0.	-0.	0.	0.008	-0.039
7.400	-0.	-0.	0.	0.007	-0.034
7.600	-0.	-0.	0.	0.006	-0.029
7.800	-0.	-0.	0.	0.005	-0.025
8.000	-0.	-0.	0.	0.004	-0.022
8.200	-0.	-0.	0.	0.003	-0.019
8.400	-0.	-0.	0.	0.003	-0.017
8.600	-0.	-0.	0.	0.002	-0.015
8.800	-0.	-0.	0.	0.002	-0.013
9.000	-0.	-0.	0.	0.001	-0.011
9.500	-0.	-0.	0.	0.001	-0.008
10.000	-0.	-0.	0.	0.001	-0.005
10.500	-0.	-0.	0.	0.	-0.004
11.000	-0.	-0.	0.	0.	-0.003
11.500	-0.	-0.	0.	0.	-0.002
12.000	-0.	-0.	0.	0.	-0.001
12.500	-0.	-0.	0.	0.	-0.001
13.000	-0.	-0.	0.	0.	-0.001
λ	160.	15.1	10.8	1.41	0.701
$\langle r^{-2} \rangle$	424.	32.7	10.3	2.71	0.698
$\langle r^{-1} \rangle$	14.6	2.83	2.71	0.697	0.562
$\langle r \rangle$	0.104	0.516	0.483	1.93	2.37
$\langle r^2 \rangle$	0.014	0.316	0.292	4.33	6.70

**P<sup>+</sup> 1S**

r	1s	2s	2p	3s	3p
0.001	0.111	0.030	0.	0.009	0.
0.002	0.219	0.060	0.	0.017	0.
0.004	0.425	0.115	0.002	0.033	0.
0.006	0.619	0.168	0.004	0.049	0.001
0.008	0.801	0.217	0.006	0.063	0.002
0.010	0.971	0.263	0.010	0.076	0.002
0.015	1.352	0.365	0.021	0.106	0.005
0.020	1.673	0.450	0.036	0.130	0.009
0.025	1.941	0.519	0.055	0.150	0.014
0.030	2.163	0.573	0.076	0.166	0.019
0.035	2.343	0.615	0.100	0.177	0.025
0.040	2.486	0.645	0.126	0.186	0.032
0.050	2.680	0.674	0.183	0.194	0.046
0.060	2.775	0.669	0.246	0.191	0.062
0.070	2.795	0.636	0.312	0.181	0.079
0.080	2.759	0.582	0.381	0.164	0.096
0.090	2.681	0.511	0.450	0.143	0.113
0.100	2.575	0.427	0.520	0.117	0.131
0.120	2.311	0.234	0.655	0.059	0.164

r	1s	2s	2p	3s	3p
0.140	2.018	0.024	0.783	-0.004	0.194
0.160	1.729	-0.187	0.899	-0.066	0.222
0.180	1.460	-0.391	1.003	-0.126	0.245
0.200	1.219	-0.580	1.094	-0.181	0.264
0.220	1.009	-0.752	1.171	-0.229	0.279
0.240	0.829	-0.904	1.235	-0.270	0.290
0.260	0.677	-1.035	1.286	-0.304	0.297
0.280	0.551	-1.146	1.328	-0.330	0.300
0.300	0.446	-1.237	1.354	-0.349	0.299
0.350	0.260	-1.389	1.386	-0.369	0.285
0.400	0.150	-1.450	1.371	-0.353	0.255
0.450	0.086	-1.443	1.323	-0.310	0.212
0.500	0.050	-1.390	1.252	-0.248	0.162
0.550	0.029	-1.306	1.169	-0.173	0.105
0.600	0.017	-1.205	1.078	-0.090	0.045
0.650	0.010	-1.095	0.984	-0.002	-0.017
0.700	0.006	-0.984	0.892	0.086	-0.079
0.750	0.004	-0.875	0.803	0.173	-0.140
0.800	0.002	-0.772	0.718	0.256	-0.199
0.850	0.002	-0.677	0.639	0.335	-0.256
0.900	0.001	-0.590	0.567	0.408	-0.310
0.950	0.001	-0.511	0.501	0.475	-0.360
1.000	0.001	-0.441	0.441	0.535	-0.407
1.100	0.	-0.325	0.339	0.636	-0.490
1.200	0.	-0.237	0.258	0.712	-0.558
1.300	0.	-0.171	0.195	0.764	-0.612
1.400	0.	-0.122	0.147	0.796	-0.652
1.500	0.	-0.087	0.110	0.810	-0.681
1.600	0.	-0.062	0.082	0.810	-0.699
1.700	0.	-0.044	0.061	0.799	-0.709
1.800	-0.	-0.031	0.046	0.778	-0.711
1.900	-0.	-0.022	0.034	0.751	-0.706
2.000	-0.	-0.015	0.025	0.719	-0.696
2.100	-0.	-0.011	0.019	0.683	-0.682
2.200	-0.	-0.008	0.014	0.645	-0.665
2.300	-0.	-0.005	0.011	0.606	-0.644
2.400	-0.	-0.004	0.008	0.567	-0.622
2.500	-0.	-0.003	0.006	0.528	-0.599
2.600	-0.	-0.002	0.004	0.490	-0.574
2.700	-0.	-0.001	0.003	0.453	-0.549
2.800	-0.	-0.001	0.003	0.418	-0.524
2.900	-0.	-0.001	0.002	0.385	-0.499
3.000	-0.	-0.001	0.002	0.353	-0.473
3.200	-0.	-0.	0.001	0.295	-0.424
3.400	-0.	-0.	0.001	0.245	-0.378
3.600	-0.	-0.	0.	0.203	-0.335
3.800	-0.	-0.	0.	0.166	-0.295
4.000	-0.	-0.	0.	0.136	-0.258
4.200	-0.	-0.	0.	0.110	-0.226
4.400	-0.	-0.	0.	0.090	-0.196
4.600	-0.	-0.	0.	0.072	-0.170
4.800	-0.	-0.	0.	0.058	-0.147
5.000	-0.	-0.	0.	0.047	-0.127
5.200	-0.	-0.	0.	0.037	-0.109
5.400	-0.	-0.	0.	0.030	-0.093
5.600	-0.	-0.	0.	0.024	-0.080
5.800	-0.	-0.	0.	0.019	-0.068
6.000	-0.	-0.	0.	0.015	-0.058
6.200	-0.	-0.	0.	0.012	-0.050
6.400	-0.	-0.	0.	0.009	-0.042
6.600	-0.	-0.	0.	0.008	-0.036
6.800	-0.	-0.	0.	0.006	-0.030
7.000	-0.	-0.	0.	0.005	-0.026
7.200	-0.	-0.	0.	0.004	-0.022
7.400	-0.	-0.	0.	0.003	-0.018
7.600	-0.	-0.	0.	0.002	-0.015
7.800	-0.	-0.	0.	0.002	-0.013
8.000	-0.	-0.	0.	0.001	-0.011
8.200	-0.	-0.	0.	0.001	-0.009
8.400	-0.	-0.	0.	0.001	-0.008
8.600	-0.	-0.	0.	0.001	-0.006

r	1s	2s	2p	3s	3p
8.800	-0.	-0.	0.	0.001	-0.005
9.000	-0.	-0.	0.	0.	-0.004
9.500	-0.	-0.	0.	0.	-0.003
10.000	-0.	-0.	0.	0.	-0.002
10.500	-0.	-0.	0.	0.	-0.001
11.000	-0.	-0.	0.	0.	-0.001
$\lambda$	161.	15.9	11.7	2.10	1.20
$\langle r^{-2} \rangle$	424.	32.8	10.3	2.97	0.794
$\langle r^{-1} \rangle$	14.6	2.83	2.71	0.728	0.599
$\langle r \rangle$	0.104	0.515	0.483	1.84	2.22
$\langle r^2 \rangle$	0.014	0.315	0.292	3.91	5.79

P <sup>+</sup> 3P					
r	1s	2s	2p	3s	3p
0.001	0.111	0.030	0.	0.009	0.
0.002	0.219	0.059	0.	0.017	0.
0.004	0.425	0.115	0.002	0.033	0.
0.006	0.619	0.168	0.004	0.048	0.001
0.008	0.801	0.217	0.006	0.063	0.002
0.010	0.971	0.263	0.010	0.076	0.003
0.015	1.352	0.365	0.021	0.105	0.006
0.020	1.673	0.450	0.036	0.129	0.010
0.025	1.941	0.519	0.055	0.149	0.015
0.030	2.163	0.573	0.076	0.165	0.020
0.035	2.343	0.615	0.100	0.177	0.026
0.040	2.486	0.645	0.126	0.185	0.033
0.050	2.680	0.674	0.183	0.193	0.048
0.060	2.775	0.669	0.246	0.190	0.065
0.070	2.795	0.636	0.312	0.180	0.082
0.080	2.759	0.582	0.381	0.164	0.100
0.090	2.681	0.511	0.450	0.142	0.118
0.100	2.575	0.427	0.520	0.117	0.138
0.120	2.311	0.234	0.655	0.059	0.171
0.140	2.018	0.024	0.783	-0.004	0.203
0.160	1.729	-0.187	0.899	-0.066	0.231
0.180	1.460	-0.391	1.003	-0.125	0.256
0.200	1.219	-0.580	1.094	-0.180	0.276
0.220	1.009	-0.752	1.171	-0.228	0.291
0.240	0.829	-0.904	1.235	-0.268	0.303
0.260	0.677	-1.035	1.286	-0.302	0.310
0.280	0.551	-1.146	1.325	-0.328	0.313
0.300	0.446	-1.237	1.354	-0.347	0.313
0.350	0.260	-1.389	1.385	-0.367	0.298
0.400	0.150	-1.450	1.370	-0.351	0.268
0.450	0.086	-1.443	1.322	-0.309	0.222
0.500	0.050	-1.390	1.252	-0.247	0.169
0.550	0.029	-1.306	1.169	-0.173	0.110
0.600	0.017	-1.205	1.078	-0.090	0.048
0.650	0.010	-1.095	0.984	-0.003	-0.016
0.700	0.006	-0.984	0.892	0.085	-0.081
0.750	0.004	-0.875	0.803	0.171	-0.145
0.800	0.002	-0.772	0.718	0.254	-0.206
0.850	0.002	-0.677	0.639	0.332	-0.266
0.900	0.001	-0.590	0.567	0.405	-0.322
0.950	0.001	-0.511	0.501	0.471	-0.375
1.000	0.001	-0.441	0.441	0.532	-0.424
1.100	0.	-0.325	0.339	0.632	-0.510
1.200	0.	-0.237	0.258	0.708	-0.581
1.300	0.	-0.171	0.195	0.761	-0.637
1.400	0.	-0.122	0.147	0.793	-0.679
1.500	0.	-0.087	0.110	0.808	-0.708



r	1s	2s	2p	3s	3p	r	1s	2s	2p	3s	3p
1.600	0.	-0.062	0.082	0.808	-0.726	0.035	2.343	0.615	0.100	0.177	0.026
1.700	0.	-0.044	0.061	0.798	-0.735	0.040	2.486	0.645	0.126	0.185	0.032
1.800	-0.	-0.031	0.046	0.778	-0.734	0.050	2.680	0.674	0.183	0.193	0.047
1.900	-0.	-0.022	0.034	0.751	-0.727	0.060	2.775	0.669	0.246	0.191	0.063
2.000	-0.	-0.015	0.025	0.719	-0.714	0.070	2.795	0.636	0.312	0.181	0.080
2.100	-0.	-0.011	0.019	0.684	-0.697	0.080	2.759	0.582	0.381	0.164	0.098
2.200	-0.	-0.008	0.014	0.647	-0.676	0.090	2.681	0.511	0.450	0.142	0.115
2.300	-0.	-0.005	0.011	0.608	-0.651	0.100	2.575	0.427	0.520	0.117	0.133
2.400	-0.	-0.004	0.008	0.569	-0.625	0.120	2.311	0.234	0.655	0.059	0.167
2.500	-0.	-0.003	0.006	0.531	-0.598	0.140	2.018	0.024	0.783	-0.004	0.198
2.600	-0.	-0.002	0.005	0.493	-0.569	0.160	1.729	-0.187	0.899	-0.066	0.226
2.700	-0.	-0.002	0.003	0.456	-0.540	0.180	1.460	-0.391	1.003	-0.126	0.249
2.800	-0.	-0.001	0.003	0.421	-0.511	0.200	1.219	-0.580	1.094	-0.180	0.269
2.900	-0.	-0.001	0.002	0.388	-0.483	0.220	1.009	-0.752	1.171	-0.228	0.284
3.000	-0.	-0.001	0.002	0.356	-0.454	0.240	0.829	-0.904	1.235	-0.269	0.295
3.200	-0.	-0.	0.001	0.298	-0.400	0.260	0.677	-1.035	1.286	-0.303	0.302
3.400	-0.	-0.	0.001	0.248	-0.349	0.280	0.551	-1.146	1.326	-0.329	0.306
3.600	-0.	-0.	0.	0.205	-0.302	0.300	0.446	-1.237	1.354	-0.348	0.305
3.800	-0.	-0.	0.	0.168	-0.261	0.350	0.260	-1.389	1.386	-0.368	0.291
4.000	-0.	-0.	0.	0.138	-0.223	0.400	0.150	-1.450	1.371	-0.352	0.260
4.200	-0.	-0.	0.	0.112	-0.191	0.450	0.088	-1.443	1.323	-0.310	0.217
4.400	-0.	-0.	0.	0.091	-0.162	0.500	0.050	-1.390	1.252	-0.248	0.166
4.600	-0.	-0.	0.	0.073	-0.137	0.550	0.029	-1.306	1.169	-0.173	0.109
4.800	-0.	-0.	0.	0.059	-0.115	0.600	0.017	-1.205	1.078	-0.090	0.048
5.000	-0.	-0.	0.	0.047	-0.097	0.650	0.010	-1.095	0.984	-0.002	-0.015
5.200	-0.	-0.	0.	0.038	-0.081	0.700	0.006	-0.984	0.892	0.086	-0.078
5.400	-0.	-0.	0.	0.030	-0.068	0.750	0.004	-0.875	0.803	0.172	-0.140
5.600	-0.	-0.	0.	0.024	-0.057	0.800	0.002	-0.772	0.718	0.255	-0.200
5.800	-0.	-0.	0.	0.019	-0.047	0.850	0.002	-0.677	0.639	0.333	-0.258
6.000	-0.	-0.	0.	0.015	-0.039	0.900	0.001	-0.590	0.567	0.406	-0.313
6.200	-0.	-0.	0.	0.012	-0.032	0.950	0.001	-0.511	0.501	0.473	-0.365
6.400	-0.	-0.	0.	0.010	-0.027	1.000	0.001	-0.441	0.441	0.533	-0.413
6.600	-0.	-0.	0.	0.008	-0.022	1.100	0.	-0.325	0.339	0.634	-0.498
6.800	-0.	-0.	0.	0.006	-0.018	1.200	0.	-0.237	0.258	0.710	-0.568
7.000	-0.	-0.	0.	0.005	-0.015	1.300	0.	-0.171	0.195	0.762	-0.623
7.200	-0.	-0.	0.	0.004	-0.012	1.400	0.	-0.122	0.147	0.794	-0.665
7.400	-0.	-0.	0.	0.003	-0.010	1.500	0.	-0.087	0.110	0.809	-0.694
7.600	-0.	-0.	0.	0.002	-0.008	1.600	0.	-0.062	0.082	0.809	-0.713
7.800	-0.	-0.	0.	0.002	-0.007	1.700	0.	-0.044	0.061	0.798	-0.723
8.000	-0.	-0.	0.	0.001	-0.006	1.800	-0.	-0.031	0.046	0.778	-0.724
8.200	-0.	-0.	0.	0.001	-0.005	1.900	-0.	-0.022	0.034	0.751	-0.718
8.400	-0.	-0.	0.	0.001	-0.004	2.000	-0.	-0.015	0.025	0.719	-0.707
8.600	-0.	-0.	0.	0.001	-0.003	2.100	-0.	-0.011	0.019	0.683	-0.692
8.800	-0.	-0.	0.	0.001	-0.002	2.200	-0.	-0.008	0.014	0.646	-0.672
9.000	-0.	-0.	0.	0.	-0.002	2.300	-0.	-0.005	0.011	0.607	-0.650
9.500	-0.	-0.	0.	0.	-0.001	2.400	-0.	-0.004	0.008	0.568	-0.626
10.000	-0.	-0.	0.	0.	-0.001	2.500	-0.	-0.003	0.006	0.529	-0.601
λ	161.	15.8	11.6	2.06	1.52	2.600	-0.	-0.002	0.004	0.491	-0.574
⟨r <sup>-2</sup> ⟩	424.	32.8	10.3	2.94	0.854	2.700	-0.	-0.001	0.003	0.455	-0.547
⟨r <sup>-1</sup> ⟩	14.6	2.83	2.71	0.725	0.623	2.800	-0.	-0.001	0.003	0.420	-0.519
⟨r⟩	0.104	0.515	0.483	1.85	2.12	2.900	-0.	-0.001	0.002	0.386	-0.492
⟨r <sup>2</sup> ⟩	0.014	0.315	0.292	3.94	5.22	3.000	-0.	-0.001	0.002	0.354	-0.465
						3.200	-0.	-0.	0.001	0.297	-0.413
						3.400	-0.	-0.	0.001	0.247	-0.364
						3.600	-0.	-0.	0.	0.204	-0.318
						3.800	-0.	-0.	0.	0.167	-0.277
						4.000	-0.	-0.	0.	0.137	-0.240
						4.200	-0.	-0.	0.	0.111	-0.207
						4.400	-0.	-0.	0.	0.090	-0.177
						4.600	-0.	-0.	0.	0.073	-0.152
						4.800	-0.	-0.	0.	0.059	-0.129
						5.000	-0.	-0.	0.	0.047	-0.110
						5.200	-0.	-0.	0.	0.038	-0.093
						5.400	-0.	-0.	0.	0.030	-0.079
						5.600	-0.	-0.	0.	0.024	-0.067
						5.800	-0.	-0.	0.	0.019	-0.058
						6.000	-0.	-0.	0.	0.015	-0.047
						6.200	-0.	-0.	0.	0.012	-0.039
						6.400	-0.	-0.	0.	0.009	-0.033
						6.600	-0.	-0.	0.	0.007	-0.028

**P<sup>+</sup> 1D**

r	1s	2s	2p	3s	3p
0.001	0.111	0.030	0.	0.009	0.
0.002	0.219	0.059	0.	0.017	0.
0.004	0.425	0.115	0.002	0.033	0.
0.005	0.619	0.168	0.004	0.048	0.001
0.010	1.801	0.217	0.006	0.063	0.002
0.015	0.971	0.263	0.010	0.076	0.003
0.015	1.352	0.365	0.021	0.105	0.005
0.020	1.673	0.450	0.036	0.130	0.009
0.025	1.941	0.519	0.055	0.150	0.014
0.030	2.163	0.573	0.076	0.165	0.020

r	1s	2s	2p	3s	3p
6.800	-0.	-0.	0.	0.006	-0.023
7.000	-0.	-0.	0.	0.005	-0.019
7.200	-0.	-0.	0.	0.004	-0.016
7.400	-0.	-0.	0.	0.003	-0.013
7.600	-0.	-0.	0.	0.002	-0.011
7.800	-0.	-0.	0.	0.002	-0.009
8.000	-0.	-0.	0.	0.001	-0.008
8.200	-0.	-0.	0.	0.001	-0.006
8.400	-0.	-0.	0.	0.001	-0.005
8.600	-0.	-0.	0.	0.001	-0.004
8.800	-0.	-0.	0.	0.001	-0.004
9.000	-0.	-0.	0.	0.	-0.003
9.500	-0.	-0.	0.	0.	-0.002
10.000	-0.	-0.	0.	0.	-0.001
10.500	-0.	-0.	0.	0.	-0.001
$\lambda$	161.	15.9	11.6	2.08	1.34
$\langle r^{-2} \rangle$	424.	32.8	10.3	2.95	0.820
$\langle r^{-1} \rangle$	14.6	2.83	2.71	0.728	0.610
$\langle r \rangle$	0.104	0.515	0.483	1.85	2.16
$\langle r^2 \rangle$	0.014	0.315	0.292	3.92	5.48

### P<sup>++</sup> 3P

r	1s	2s	2p	3s	3p
0.001	0.111	0.030	0.	0.009	0.
0.002	0.219	0.060	0.	0.018	0.
0.004	0.425	0.116	0.002	0.035	0.
0.006	0.619	0.168	0.004	0.051	0.001
0.008	0.801	0.217	0.006	0.066	0.002
0.010	0.971	0.264	0.010	0.080	0.003
0.015	1.352	0.366	0.021	0.111	0.006
0.020	1.673	0.450	0.036	0.138	0.010
0.025	1.941	0.519	0.055	0.157	0.016
0.030	2.163	0.574	0.078	0.174	0.022
0.035	2.343	0.616	0.100	0.186	0.028
0.040	2.486	0.646	0.126	0.195	0.036
0.050	2.680	0.675	0.183	0.203	0.052
0.060	2.775	0.669	0.246	0.201	0.070
0.070	2.795	0.637	0.313	0.190	0.089
0.080	2.759	0.582	0.381	0.172	0.108
0.090	2.681	0.511	0.451	0.149	0.127
0.100	2.575	0.427	0.520	0.123	0.147
0.120	2.311	0.234	0.656	0.062	0.184
0.140	2.018	0.024	0.783	-0.004	0.218
0.160	1.729	-0.188	0.900	-0.070	0.249
0.180	1.460	-0.391	1.004	-0.132	0.275
0.200	1.219	-0.581	1.095	-0.190	0.297
0.220	1.009	-0.753	1.172	-0.240	0.313
0.240	0.829	-0.905	1.235	-0.283	0.326
0.260	0.677	-1.036	1.287	-0.318	0.333
0.280	0.551	-1.147	1.326	-0.346	0.337
0.300	0.446	-1.239	1.355	-0.366	0.336
0.350	0.260	-1.390	1.386	-0.386	0.320
0.400	0.150	-1.451	1.371	-0.369	0.285
0.450	0.086	-1.444	1.323	-0.324	0.237
0.500	0.050	-1.390	1.253	-0.258	0.180
0.550	0.029	-1.306	1.169	-0.178	0.116
0.600	0.017	-1.204	1.077	-0.090	0.048
0.650	0.010	-1.095	0.984	0.002	-0.022
0.700	0.006	-0.983	0.891	0.095	-0.091
0.750	0.004	-0.874	0.802	0.186	-0.160
0.800	0.002	-0.771	0.718	0.273	-0.227
0.850	0.002	-0.676	0.639	0.355	-0.291

r	1s	2s	2p	3s	3p
0.900	0.001	-0.589	0.566	0.431	-0.351
0.950	0.001	-0.510	0.500	0.501	-0.407
1.000	0.001	-0.440	0.440	0.563	-0.460
1.100	0.	-0.324	0.338	0.667	-0.551
1.200	0.	-0.236	0.257	0.744	-0.625
1.300	0.	-0.170	0.194	0.795	-0.682
1.400	0.	-0.121	0.146	0.824	-0.724
1.500	0.	-0.086	0.109	0.835	-0.751
1.600	0.	-0.061	0.082	0.831	-0.765
1.700	0.	-0.043	0.061	0.814	-0.768
1.800	0.	-0.030	0.045	0.788	-0.763
1.900	0.	-0.021	0.033	0.755	-0.749
2.000	-0.	-0.015	0.025	0.717	-0.730
2.100	-0.	-0.010	0.018	0.676	-0.706
2.200	-0.	-0.007	0.014	0.633	-0.678
2.300	-0.	-0.005	0.010	0.589	-0.647
2.400	-0.	-0.004	0.008	0.546	-0.615
2.500	-0.	-0.003	0.006	0.503	-0.581
2.600	-0.	-0.002	0.004	0.462	-0.547
2.700	-0.	-0.001	0.003	0.423	-0.513
2.800	-0.	-0.001	0.002	0.386	-0.479
2.900	-0.	-0.001	0.002	0.351	-0.446
3.000	-0.	-0.	0.001	0.318	-0.415

3.200	-0.	-0.	0.001	0.259	-0.355
3.400	-0.	-0.	0.	0.209	-0.301
3.600	-0.	-0.	0.	0.168	-0.253
3.800	-0.	-0.	0.	0.134	-0.211
4.000	-0.	-0.	0.	0.100	-0.175
4.200	-0.	-0.	0.	0.083	-0.144
4.400	-0.	-0.	0.	0.065	-0.119
4.600	-0.	-0.	0.	0.051	-0.097
4.800	-0.	-0.	0.	0.040	-0.079
5.000	-0.	-0.	0.	0.031	-0.064
5.200	-0.	-0.	0.	0.024	-0.052
5.400	-0.	-0.	0.	0.018	-0.041
5.600	-0.	-0.	0.	0.014	-0.033
5.800	-0.	-0.	0.	0.011	-0.027
6.000	-0.	-0.	0.	0.008	-0.021
6.200	-0.	-0.	0.	0.006	-0.017
6.400	-0.	-0.	0.	0.005	-0.013
6.600	-0.	-0.	0.	0.004	-0.011
6.800	-0.	-0.	0.	0.003	-0.008
7.000	-0.	-0.	0.	0.002	-0.007
7.200	-0.	-0.	0.	0.002	-0.005
7.400	-0.	-0.	0.	0.001	-0.004
7.600	-0.	-0.	0.	0.001	-0.003
7.800	-0.	-0.	0.	0.001	-0.003
8.000	-0.	-0.	0.	0.	-0.002
8.200	-0.	-0.	0.	0.	-0.002
8.400	-0.	-0.	0.	0.	-0.001
8.600	-0.	-0.	0.	0.	-0.001
8.800	-0.	-0.	0.	0.	-0.001
9.000	-0.	-0.	0.	0.	-0.001

$\lambda$	162.	16.8	12.6	2.83	2.18
$\langle r^{-2} \rangle$	424.	32.8	10.3	3.24	0.965
$\langle r^{-1} \rangle$	14.6	2.84	2.71	0.758	0.663
$\langle r \rangle$	0.104	0.515	0.483	1.77	1.98
$\langle r^2 \rangle$	0.014	0.315	0.291	3.58	4.55

### S 1S

r	1s	2s	2p	3s	3p
0.001	0.123	0.034	0.	0.010	0.
0.002	0.241	0.067	0.001	0.019	0.
0.004	0.467	0.129	0.002	0.037	0.001
0.006	0.679	0.187	0.004	0.054	0.001
0.008	0.876	0.242	0.008	0.070	0.002
0.010	1.061	0.292	0.012	0.085	0.003

r	1s	2s	2p	3s	3p
0.015	1.469	0.403	0.028	0.117	0.006
0.020	1.809	0.494	0.044	0.143	0.011
0.025	2.089	0.566	0.066	0.164	0.017
0.030	2.316	0.622	0.091	0.180	0.023
0.035	2.496	0.662	0.120	0.192	0.030
0.040	2.636	0.690	0.150	0.199	0.038
0.050	2.814	0.710	0.218	0.204	0.055
0.060	2.885	0.691	0.291	0.198	0.073
0.070	2.878	0.643	0.367	0.183	0.092
0.080	2.813	0.571	0.446	0.161	0.112
0.090	2.707	0.482	0.525	0.134	0.131
0.100	2.575	0.381	0.603	0.103	0.150
0.120	2.266	0.154	0.754	0.034	0.187
0.140	1.942	-0.084	0.893	-0.037	0.219
0.160	1.632	-0.318	1.017	-0.106	0.247
0.180	1.352	-0.538	1.125	-0.170	0.270
0.200	1.108	-0.738	1.216	-0.227	0.288
0.220	0.900	-0.914	1.291	-0.275	0.301
0.240	0.726	-1.065	1.350	-0.314	0.309
0.260	0.582	-1.192	1.394	-0.345	0.312
0.280	0.465	-1.295	1.425	-0.366	0.310
0.300	0.370	-1.375	1.445	-0.379	0.305
0.350	0.206	-1.492	1.448	-0.380	0.277
0.400	0.114	-1.514	1.404	-0.342	0.233
0.450	0.063	-1.469	1.328	-0.277	0.176
0.500	0.035	-1.381	1.233	-0.194	0.112
0.550	0.019	-1.268	1.128	-0.099	0.043
0.600	0.011	-1.141	1.019	0.001	-0.028
0.650	0.006	-1.017	0.912	0.101	-0.099
0.700	0.004	-0.894	0.810	0.200	-0.168
0.750	0.002	-0.779	0.714	0.293	-0.234
0.800	0.001	-0.673	0.626	0.380	-0.297
0.850	0.001	-0.577	0.546	0.460	-0.356
0.900	0.001	-0.492	0.475	0.531	-0.411
0.950	0.	-0.418	0.411	0.594	-0.461
1.000	0.	-0.354	0.354	0.649	-0.506
1.100	0.	-0.250	0.262	0.735	-0.582
1.200	0.	-0.175	0.191	0.792	-0.640
1.300	0.	-0.122	0.139	0.824	-0.682
1.400	0.	-0.084	0.101	0.836	-0.709
1.500	-0.	-0.058	0.073	0.832	-0.725
1.600	-0.	-0.040	0.052	0.815	-0.731
1.700	-0.	-0.027	0.038	0.788	-0.728
1.800	-0.	-0.019	0.027	0.755	-0.719
1.900	-0.	-0.013	0.020	0.717	-0.704
2.000	-0.	-0.009	0.014	0.677	-0.686
2.100	-0.	-0.006	0.010	0.635	-0.664
2.200	-0.	-0.005	0.007	0.593	-0.640
2.300	-0.	-0.003	0.005	0.551	-0.615
2.400	-0.	-0.002	0.004	0.511	-0.588
2.500	-0.	-0.002	0.003	0.472	-0.562
2.600	-0.	-0.001	0.002	0.435	-0.535
2.700	-0.	-0.001	0.002	0.399	-0.508
2.800	-0.	-0.001	0.001	0.366	-0.481
2.900	-0.	-0.001	0.001	0.335	-0.455
3.000	-0.	-0.001	0.001	0.306	-0.430
3.200	-0.	-0.	0.	0.254	-0.382
3.400	-0.	-0.	0.	0.210	-0.338
3.600	-0.	-0.	0.	0.173	-0.298
3.800	-0.	-0.	0.	0.142	-0.261
4.000	-0.	-0.	0.	0.116	-0.229
4.200	-0.	-0.	0.	0.094	-0.200
4.400	-0.	-0.	0.	0.077	-0.174
4.600	-0.	-0.	0.	0.062	-0.151
4.800	-0.	-0.	0.	0.051	-0.131
5.000	-0.	-0.	0.	0.041	-0.113
5.200	-0.	-0.	0.	0.033	-0.098
5.400	-0.	-0.	0.	0.027	-0.085
5.600	-0.	-0.	0.	0.021	-0.073
5.800	-0.	-0.	0.	0.017	-0.063
6.000	-0.	-0.	0.	0.014	-0.054
6.200	-0.	-0.	0.	0.011	-0.047

r	1s	2s	2p	3s	3p
6.400	-0.	-0.	0.	0.009	-0.040
6.600	-0.	-0.	0.	0.007	-0.034
6.800	-0.	-0.	0.	0.006	-0.029
7.000	-0.	-0.	0.	0.005	-0.025
7.200	-0.	-0.	0.	0.004	-0.022
7.400	-0.	-0.	0.	0.003	-0.018
7.600	-0.	-0.	0.	0.002	-0.016
7.800	-0.	-0.	0.	0.002	-0.013
8.000	-0.	-0.	0.	0.002	-0.011
8.200	-0.	-0.	0.	0.001	-0.010
8.400	-0.	-0.	0.	0.001	-0.008
8.600	-0.	-0.	0.	0.001	-0.007
8.800	-0.	-0.	0.	0.001	-0.006
9.000	-0.	-0.	0.	0.001	-0.005
9.500	-0.	-0.	0.	0.	-0.003
10.000	-0.	-0.	0.	0.	-0.002
10.500	-0.	-0.	0.	0.	-0.002
11.000	-0.	-0.	0.	0.	-0.001
11.500	-0.	-0.	0.	0.	-0.001
$\lambda$	184.	18.0	13.4	1.77	0.840
$\langle r^{-2} \rangle$	484.	38.5	12.2	3.51	0.928
$\langle r^{-1} \rangle$	15.6	3.07	2.95	0.787	0.647
$\langle r \rangle$	0.097	0.476	0.441	1.72	2.07
$\langle r^2 \rangle$	0.013	0.268	0.242	3.44	5.15
<b>S<sup>3</sup>P</b>					
r	1s	2s	2p	3s	3p
0.001	0.123	0.034	0.	0.010	0.
0.002	0.241	0.067	0.001	0.019	0.
0.004	0.467	0.129	0.002	0.037	0.001
0.006	0.679	0.187	0.004	0.054	0.001
0.008	0.876	0.242	0.008	0.070	0.002
0.010	1.061	0.292	0.012	0.085	0.003
0.015	1.469	0.403	0.026	0.117	0.006
0.020	1.809	0.494	0.044	0.143	0.011
0.025	2.089	0.566	0.066	0.164	0.017
0.030	2.316	0.622	0.091	0.180	0.023
0.035	2.496	0.662	0.120	0.192	0.030
0.040	2.636	0.690	0.150	0.199	0.038
0.050	2.814	0.710	0.218	0.204	0.055
0.060	2.885	0.691	0.291	0.198	0.073
0.070	2.878	0.643	0.367	0.183	0.092
0.080	2.813	0.571	0.446	0.161	0.112
0.090	2.707	0.482	0.525	0.134	0.132
0.100	2.575	0.381	0.603	0.103	0.151
0.120	2.266	0.154	0.754	0.034	0.187
0.140	1.942	-0.084	0.893	-0.037	0.220
0.160	1.632	-0.318	1.017	-0.106	0.248
0.180	1.352	-0.538	1.125	-0.170	0.271
0.200	1.108	-0.738	1.216	-0.227	0.289
0.220	0.900	-0.914	1.291	-0.275	0.302
0.240	0.726	-1.065	1.350	-0.314	0.310
0.260	0.582	-1.192	1.394	-0.344	0.313
0.280	0.465	-1.295	1.425	-0.366	0.312
0.300	0.370	-1.375	1.445	-0.379	0.307
0.350	0.206	-1.492	1.448	-0.379	0.279
0.400	0.114	-1.514	1.404	-0.342	0.234
0.450	0.063	-1.469	1.328	-0.277	0.177
0.500	0.035	-1.381	1.233	-0.194	0.113
0.550	0.019	-1.268	1.128	-0.099	0.044
0.600	0.011	-1.141	1.019	0.	-0.027
0.650	0.006	-1.017	0.912	0.101	-0.099
0.700	0.004	-0.894	0.810	0.200	-0.168

<i>r</i>	1s	2s	2p	3s	3p
0.750	0.002	-0.779	0.715	0.292	-0.235
0.800	0.001	-0.673	0.626	0.379	-0.298
0.850	0.001	-0.577	0.547	0.459	-0.357
0.900	0.001	-0.493	0.475	0.530	-0.412
0.950	0.	-0.418	0.411	0.593	-0.462
1.000	0.	-0.354	0.354	0.648	-0.507
1.100	0.	-0.250	0.262	0.734	-0.584
1.200	0.	-0.175	0.191	0.791	-0.642
1.300	0.	-0.122	0.139	0.824	-0.685
1.400	0.	-0.084	0.101	0.830	-0.713
1.500	-0.	-0.058	0.073	0.831	-0.729
1.600	-0.	-0.040	0.052	0.814	-0.734
1.700	-0.	-0.027	0.038	0.788	-0.732
1.800	-0.	-0.019	0.027	0.755	-0.722
1.900	-0.	-0.013	0.020	0.718	-0.707
2.000	-0.	-0.009	0.014	0.677	-0.688
2.100	-0.	-0.006	0.010	0.636	-0.666
2.200	-0.	-0.005	0.007	0.594	-0.642
2.300	-0.	-0.003	0.005	0.552	-0.616
2.400	-0.	-0.002	0.004	0.512	-0.589
2.500	-0.	-0.002	0.003	0.473	-0.562
2.600	-0.	-0.001	0.002	0.435	-0.534
2.700	-0.	-0.001	0.002	0.400	-0.507
2.800	-0.	-0.001	0.001	0.367	-0.480
2.900	-0.	-0.001	0.001	0.336	-0.453
3.000	-0.	-0.001	0.001	0.307	-0.428
3.200	-0.	-0.	0.	0.255	-0.379
3.400	-0.	-0.	0.	0.211	-0.334
3.600	-0.	-0.	0.	0.174	-0.293
3.800	-0.	-0.	0.	0.142	-0.257
4.000	-0.	-0.	0.	0.116	-0.224
4.200	-0.	-0.	0.	0.095	-0.195
4.400	-0.	-0.	0.	0.077	-0.169
4.600	-0.	-0.	0.	0.063	-0.146
4.800	-0.	-0.	0.	0.051	-0.126
5.000	-0.	-0.	0.	0.041	-0.109
5.200	-0.	-0.	0.	0.033	-0.094
5.400	-0.	-0.	0.	0.027	-0.081
5.600	-0.	-0.	0.	0.021	-0.069
5.800	-0.	-0.	0.	0.017	-0.060
6.000	-0.	-0.	0.	0.014	-0.051
6.200	-0.	-0.	0.	0.011	-0.044
6.400	-0.	-0.	0.	0.009	-0.037
6.600	-0.	-0.	0.	0.007	-0.032
6.800	-0.	-0.	0.	0.006	-0.027
7.000	-0.	-0.	0.	0.005	-0.023
7.200	-0.	-0.	0.	0.004	-0.020
7.400	-0.	-0.	0.	0.003	-0.017
7.600	-0.	-0.	0.	0.002	-0.014
7.800	-0.	-0.	0.	0.002	-0.012
8.000	-0.	-0.	0.	0.002	-0.010
8.200	-0.	-0.	0.	0.001	-0.009
8.400	-0.	-0.	0.	0.001	-0.007
8.600	-0.	-0.	0.	0.001	-0.006
8.800	-0.	-0.	0.	0.001	-0.005
9.000	-0.	-0.	0.	0.	-0.005
9.500	-0.	-0.	0.	0.	-0.003
10.000	-0.	-0.	0.	0.	-0.002
10.500	-0.	-0.	0.	0.	-0.001
11.000	-0.	-0.	0.	0.	-0.001
11.500	-0.	-0.	0.	0.	-0.001
$\lambda$	184.	18.0	13.4	1.76	0.875
$\langle r^{-2} \rangle$	484.	38.5	12.2	3.50	0.938
$\langle r^{-1} \rangle$	15.6	3.07	2.95	0.788	0.850
$\langle r \rangle$	0.097	0.478	0.441	1.72	2.06
$\langle r^2 \rangle$	0.013	0.269	0.242	3.44	5.07

S <sup>1D</sup>					
<i>r</i>	1s	2s	2p	3s	3p
0.001	0.123	0.034	0.	0.010	0.
0.002	0.241	0.067	0.001	0.019	0.
0.004	0.467	0.129	0.002	0.037	0.001
0.006	0.679	0.187	0.004	0.054	0.001
0.008	0.876	0.242	0.008	0.070	0.002
0.010	1.061	0.292	0.012	0.085	0.003
0.015	1.469	0.403	0.026	0.117	0.006
0.020	1.809	0.494	0.044	0.143	0.011
0.025	2.089	0.566	0.066	0.164	0.017
0.030	2.316	0.622	0.091	0.180	0.023
0.035	2.496	0.662	0.120	0.192	0.030
0.040	2.636	0.690	0.150	0.200	0.038
0.050	2.814	0.710	0.218	0.205	0.055
0.060	2.885	0.691	0.291	0.198	0.073
0.070	2.878	0.643	0.367	0.183	0.092
0.080	2.813	0.571	0.446	0.161	0.112
0.090	2.707	0.482	0.525	0.134	0.131
0.100	2.575	0.381	0.603	0.103	0.150
0.120	2.266	0.154	0.754	0.034	0.186
0.140	1.942	-0.084	0.893	-0.037	0.219
0.160	1.632	-0.318	1.017	-0.106	0.247
0.180	1.352	-0.538	1.125	-0.170	0.270
0.200	1.108	-0.738	1.216	-0.227	0.288
0.220	0.900	-0.914	1.291	-0.275	0.300
0.240	0.726	-1.065	1.350	-0.315	0.308
0.260	0.582	-1.192	1.394	-0.345	0.311
0.280	0.465	-1.295	1.425	-0.366	0.310
0.300	0.370	-1.375	1.445	-0.379	0.305
0.350	0.208	-1.492	1.448	-0.380	0.277
0.400	0.114	-1.514	1.404	-0.342	0.232
0.450	0.063	-1.469	1.328	-0.277	0.178
0.500	0.035	-1.381	1.233	-0.194	0.112
0.550	0.019	-1.268	1.128	-0.099	0.043
0.600	0.011	-1.144	1.019	0.001	-0.028
0.650	0.006	-1.017	0.912	0.101	-0.099
0.700	0.004	-0.894	0.810	0.200	-0.168
0.750	0.002	-0.779	0.714	0.293	-0.234
0.800	0.001	-0.673	0.626	0.380	-0.297
0.850	0.001	-0.577	0.546	0.460	-0.356
0.900	0.001	-0.492	0.475	0.531	-0.410
0.950	0.	-0.418	0.411	0.594	-0.460
1.000	0.	-0.354	0.354	0.649	-0.505
1.100	0.	-0.250	0.262	0.735	-0.581
1.200	0.	-0.175	0.191	0.792	-0.639
1.300	0.	-0.122	0.139	0.825	-0.681
1.400	0.	-0.084	0.101	0.836	-0.709
1.500	-0.	-0.058	0.073	0.832	-0.724
1.600	-0.	-0.040	0.052	0.815	-0.730
1.700	-0.	-0.027	0.038	0.788	-0.727
1.800	-0.	-0.019	0.027	0.755	-0.718
1.900	-0.	-0.013	0.020	0.717	-0.704
2.000	-0.	-0.009	0.014	0.677	-0.685
2.100	-0.	-0.006	0.010	0.635	-0.664
2.200	-0.	-0.005	0.007	0.593	-0.640
2.300	-0.	-0.003	0.005	0.551	-0.615
2.400	-0.	-0.002	0.004	0.511	-0.588
2.500	-0.	-0.002	0.003	0.472	-0.562
2.600	-0.	-0.001	0.002	0.434	-0.535
2.700	-0.	-0.001	0.002	0.399	-0.508
2.800	-0.	-0.001	0.001	0.366	-0.482
2.900	-0.	-0.001	0.001	0.335	-0.454
3.000	-0.	-0.001	0.001	0.306	-0.431

r	1s	2s	2p	3s	3p	r	1s	2s	2p	3s	3p
3.200	-0.	-0.	0.	0.254	-0.383	0.140	1.912	-0.084	0.893	-0.038	0.241
3.400	-0.	-0.	0.	0.210	-0.339	0.160	1.632	-0.318	1.017	-0.110	0.272
3.600	-0.	-0.	0.	0.173	-0.299	0.180	1.352	-0.538	1.125	-0.177	0.297
3.800	-0.	-0.	0.	0.142	-0.262	0.200	1.108	-0.738	1.216	-0.236	0.317
4.000	-0.	-0.	0.	0.116	-0.230	0.220	0.900	-0.914	1.291	-0.286	0.331
4.200	-0.	-0.	0.	0.094	-0.201	0.240	0.726	-1.066	1.350	-0.326	0.339
4.400	-0.	-0.	0.	0.077	-0.175	0.260	0.582	-1.192	1.394	-0.357	0.343
4.600	-0.	-0.	0.	0.062	-0.152	0.280	0.465	-1.295	1.426	-0.380	0.341
4.800	-0.	-0.	0.	0.050	-0.132	0.300	0.370	-1.376	1.445	-0.393	0.335
5.000	-0.	-0.	0.	0.041	-0.115						
5.200	-0.	-0.	0.	0.033	-0.099	0.350	0.206	-1.493	1.448	-0.393	0.304
5.400	-0.	-0.	0.	0.027	-0.086	0.400	0.114	-1.514	1.404	-0.354	0.255
5.600	-0.	-0.	0.	0.021	-0.074	0.450	0.063	-1.469	1.328	-0.286	0.193
5.800	-0.	-0.	0.	0.017	-0.064	0.500	0.035	-1.381	1.233	-0.199	0.121
6.000	-0.	-0.	0.	0.014	-0.055	0.550	0.019	-1.268	1.128	-0.101	0.045
6.200	-0.	-0.	0.	0.011	-0.047	0.600	0.011	-1.144	1.019	0.003	-0.033
6.400	-0.	-0.	0.	0.009	-0.041	0.650	0.006	-1.017	0.912	0.108	-0.111
6.600	-0.	-0.	0.	0.007	-0.035	0.700	0.004	-0.894	0.810	0.210	-0.187
6.800	-0.	-0.	0.	0.006	-0.030	0.750	0.002	-0.778	0.714	0.307	-0.260
7.000	-0.	-0.	0.	0.005	-0.026	0.800	0.001	-0.672	0.626	0.397	-0.329
7.200	-0.	-0.	0.	0.004	-0.022	0.850	0.001	-0.577	0.546	0.479	-0.394
7.400	-0.	-0.	0.	0.003	-0.019	0.900	0.001	-0.492	0.475	0.553	-0.453
7.600	-0.	-0.	0.	0.002	-0.016	0.950	0.	-0.418	0.411	0.617	-0.508
7.800	-0.	-0.	0.	0.002	-0.014	1.000	0.	-0.353	0.354	0.674	-0.556
8.000	-0.	-0.	0.	0.002	-0.012						
8.200	-0.	-0.	0.	0.001	-0.010	1.100	0.	-0.250	0.261	0.761	-0.638
8.400	-0.	-0.	0.	0.001	-0.009	1.200	0.	-0.175	0.191	0.818	-0.699
8.600	-0.	-0.	0.	0.001	-0.007	1.300	0.	-0.121	0.139	0.848	-0.742
8.800	-0.	-0.	0.	0.001	-0.006	1.400	0.	-0.084	0.101	0.857	-0.768
9.000	-0.	-0.	0.	0.001	-0.005	1.500	-0.	-0.057	0.073	0.849	-0.780
						1.600	-0.	-0.039	0.052	0.828	-0.781
						1.700	-0.	-0.027	0.038	0.797	-0.772
						1.800	-0.	-0.019	0.027	0.759	-0.755
						1.900	-0.	-0.013	0.019	0.717	-0.732
						2.000	-0.	-0.009	0.014	0.672	-0.705
						2.100	-0.	-0.006	0.010	0.626	-0.674
						2.200	-0.	-0.004	0.007	0.580	-0.641
						2.300	-0.	-0.003	0.005	0.535	-0.607
						2.400	-0.	-0.002	0.004	0.491	-0.572
						2.500	-0.	-0.002	0.003	0.449	-0.538
						2.600	-0.	-0.001	0.002	0.410	-0.503
						2.700	-0.	-0.001	0.002	0.372	-0.470
						2.800	-0.	-0.001	0.001	0.338	-0.437
						2.900	-0.	-0.001	0.001	0.306	-0.406
						3.000	-0.	-0.	0.001	0.276	-0.376
						3.200	-0.	-0.	0.	0.223	-0.320
						3.400	-0.	-0.	0.	0.180	-0.271
						3.600	-0.	-0.	0.	0.144	-0.228
						3.800	-0.	-0.	0.	0.114	-0.191
						4.000	-0.	-0.	0.	0.090	-0.159
						4.200	-0.	-0.	0.	0.071	-0.131
						4.400	-0.	-0.	0.	0.056	-0.109
						4.600	-0.	-0.	0.	0.044	-0.089
						4.800	-0.	-0.	0.	0.034	-0.073
						5.000	-0.	-0.	0.	0.027	-0.060
						5.200	-0.	-0.	0.	0.021	-0.049
						5.400	-0.	-0.	0.	0.016	-0.040
						5.600	-0.	-0.	0.	0.012	-0.032
						5.800	-0.	-0.	0.	0.010	-0.026
						6.000	-0.	-0.	0.	0.007	-0.021
						6.200	-0.	-0.	0.	0.006	-0.017
						6.400	-0.	-0.	0.	0.004	-0.014
						6.600	-0.	-0.	0.	0.003	-0.011
						6.800	-0.	-0.	0.	0.003	-0.009
						7.000	-0.	-0.	0.	0.002	-0.007
						7.200	-0.	-0.	0.	0.001	-0.006
						7.400	-0.	-0.	0.	0.001	-0.005
						7.600	-0.	-0.	0.	0.001	-0.004
						7.800	-0.	-0.	0.	0.001	-0.003
						8.000	-0.	-0.	0.	0.001	-0.002
						8.200	-0.	-0.	0.	0.	-0.002
						8.400	-0.	-0.	0.	0.	-0.002
						8.600	-0.	-0.	0.	0.	-0.001

r	1s	2s	2p	3s	3p
9.500	-0.	-0.	0.	0.	-0.004
10.000	-0.	-0.	0.	0.	-0.002
10.500	-0.	-0.	0.	0.	-0.002
11.000	-0.	-0.	0.	0.	-0.001
11.500	-0.	-0.	0.	0.	0.001

$\lambda$	184.	18.0	13.4	1.77	0.831
$\langle r^{-2} \rangle$	484.	38.5	12.2	3.51	0.927
$\langle r^{-1} \rangle$	15.6	3.07	2.95	0.787	0.646
$\langle r \rangle$	0.097	0.476	0.441	1.72	2.08
$\langle r^2 \rangle$	0.013	0.268	0.242	3.43	5.17

**S<sup>+</sup> S**

r	1s	2s	2p	3s	3p
0.001	0.123	0.034	0.	0.010	0.
0.002	0.241	0.067	0.001	0.020	0.
0.004	0.467	0.129	0.002	0.039	0.001
0.006	0.679	0.187	0.004	0.056	0.001
0.008	0.876	0.242	0.008	0.073	0.002
0.010	1.061	0.292	0.012	0.088	0.003
0.015	1.470	0.403	0.026	0.121	0.007
0.020	1.809	0.494	0.044	0.149	0.012
0.025	2.089	0.566	0.066	0.170	0.018
0.030	2.316	0.622	0.091	0.187	0.025
0.035	2.496	0.663	0.120	0.199	0.033
0.040	2.636	0.690	0.150	0.207	0.042
0.050	2.814	0.710	0.218	0.212	0.060
0.060	2.885	0.692	0.291	0.205	0.080
0.070	2.878	0.643	0.368	0.190	0.101
0.080	2.813	0.572	0.446	0.167	0.123
0.090	2.707	0.482	0.525	0.139	0.144
0.100	2.575	0.381	0.603	0.107	0.165
0.120	2.266	0.154	0.754	0.036	0.205

r	1s	2s	2p	3s	3p
8.800	—0.	—0.	0.	0.	—0.001
9.000	—0.	—0.	0.	0.	—0.001
$\lambda$	185.	18.9	14.2	2.48	1.72
$\langle r^{-2} \rangle$	484.	38.5	12.2	3.76	1.09
$\langle r^{-1} \rangle$	15.6	3.07	2.96	0.813	0.705
$\langle r \rangle$	0.097	0.476	0.441	1.66	1.88
$\langle r^2 \rangle$	0.013	0.268	0.242	3.17	4.13

r	1s	2s	2p	3s	3p
2.000	—0.	—0.009	0.014	0.671	—0.699
2.100	—0.	—0.006	0.010	0.624	—0.670
2.200	—0.	—0.004	0.007	0.578	—0.640
2.300	—0.	—0.003	0.005	0.533	—0.608
2.400	—0.	—0.002	0.004	0.489	—0.576
2.500	—0.	—0.002	0.003	0.447	—0.544
2.600	—0.	—0.001	0.002	0.408	—0.511
2.700	—0.	—0.001	0.002	0.371	—0.480
2.800	—0.	—0.001	0.001	0.336	—0.449
2.900	—0.	—0.001	0.001	0.304	—0.419
3.000	—0.	—0.	0.001	0.274	—0.390

S<sup>+</sup> \*P

r	1s	2s	2p	3s	3p
0.001	0.123	0.034	0.	0.010	0.
0.002	0.241	0.067	0.001	0.020	0.
0.004	0.467	0.129	0.002	0.039	0.001
0.006	0.679	0.187	0.004	0.057	0.001
0.008	0.876	0.242	0.008	0.073	0.002
0.010	1.061	0.292	0.012	0.088	0.003
0.015	1.470	0.404	0.026	0.122	0.007
0.020	1.809	0.494	0.044	0.149	0.012
0.025	2.089	0.566	0.066	0.171	0.018
0.030	2.316	0.622	0.091	0.187	0.025
0.035	2.496	0.663	0.120	0.200	0.033
0.040	2.636	0.690	0.150	0.207	0.041
0.050	2.814	0.710	0.218	0.213	0.059
0.060	2.885	0.692	0.291	0.206	0.079
0.070	2.878	0.643	0.368	0.190	0.100
0.080	2.813	0.572	0.446	0.167	0.121
0.090	2.707	0.483	0.525	0.139	0.142
0.100	2.575	0.381	0.603	0.107	0.163
0.120	2.266	0.154	0.754	0.036	0.202
0.140	1.942	—0.084	0.893	—0.039	0.237
0.160	1.632	—0.318	1.017	—0.111	0.268
0.180	1.352	—0.539	1.125	—0.177	0.292
0.200	1.108	—0.738	1.216	—0.236	0.312
0.220	0.900	—0.914	1.291	—0.286	0.325
0.240	0.728	—1.066	1.350	—0.327	0.333
0.260	0.582	—1.192	1.395	—0.359	0.337
0.280	0.465	—1.295	1.426	—0.381	0.335
0.300	0.370	—1.376	1.445	—0.394	0.329
0.350	0.206	—1.493	1.449	—0.394	0.299
0.400	0.114	—1.514	1.404	—0.355	0.250
0.450	0.063	—1.469	1.328	—0.287	0.188
0.500	0.035	—1.381	1.233	—0.199	0.117
0.550	0.019	—1.268	1.128	—0.101	0.042
0.600	0.011	—1.143	1.019	0.004	—0.035
0.650	0.006	—1.017	0.912	0.109	—0.112
0.700	0.004	—0.894	0.810	0.211	—0.187
0.750	0.002	—0.778	0.714	0.308	—0.259
0.800	0.001	—0.672	0.626	0.398	—0.327
0.850	0.001	—0.576	0.546	0.481	—0.390
0.900	0.001	—0.492	0.474	0.555	—0.448
0.950	0.	—0.417	0.411	0.620	—0.501
1.000	0.	—0.353	0.354	0.676	—0.549
1.100	0.	—0.249	0.261	0.763	—0.628
1.200	0.	—0.174	0.191	0.819	—0.688
1.300	0.	—0.121	0.139	0.850	—0.729
1.400	0.	—0.083	0.101	0.858	—0.755
1.500	—0.	—0.057	0.073	0.850	—0.767
1.600	—0.	—0.039	0.052	0.828	—0.768
1.700	—0.	—0.027	0.038	0.797	—0.760
1.800	—0.	—0.018	0.027	0.758	—0.745
1.900	—0.	—0.013	0.019	0.716	—0.724

3.200	—0.	—0.	0.	0.222	—0.337
3.400	—0.	—0.	0.	0.178	—0.289
3.600	—0.	—0.	0.	0.143	—0.246
3.800	—0.	—0.	0.	0.113	—0.209
4.000	—0.	—0.	0.	0.090	—0.176
4.200	—0.	—0.	0.	0.071	—0.148
4.400	—0.	—0.	0.	0.056	—0.124
4.600	—0.	—0.	0.	0.044	—0.104
4.800	—0.	—0.	0.	0.034	—0.087
5.000	—0.	—0.	0.	0.026	—0.072
5.200	—0.	—0.	0.	0.021	—0.060
5.400	—0.	—0.	0.	0.016	—0.049
5.600	—0.	—0.	0.	0.012	—0.041
5.800	—0.	—0.	0.	0.010	—0.034
6.000	—0.	—0.	0.	0.007	—0.028
6.200	—0.	—0.	0.	0.006	—0.023
6.400	—0.	—0.	0.	0.004	—0.019
6.600	—0.	—0.	0.	0.003	—0.015
6.800	—0.	—0.	0.	0.003	—0.012
7.000	—0.	—0.	0.	0.002	—0.010
7.200	—0.	—0.	0.	0.002	—0.008
7.400	—0.	—0.	0.	0.001	—0.007
7.600	—0.	—0.	0.	0.001	—0.005
7.800	—0.	—0.	0.	0.001	—0.004
8.000	—0.	—0.	0.	0.001	—0.004
8.200	—0.	—0.	0.	0.	—0.003
8.400	—0.	—0.	0.	0.	—0.002
8.600	—0.	—0.	0.	0.	—0.002
8.800	—0.	—0.	0.	0.	—0.002
9.000	—0.	—0.	0.	0.	—0.001

r	1s	2s	2p	3s	3p
9.500	—0.	—0.	0.	0.	—0.001
$\lambda$	185.	18.9	14.3	2.51	1.55
$\langle r^{-2} \rangle$	484.	38.5	12.2	3.78	1.06
$\langle r^{-1} \rangle$	15.6	3.08	2.96	0.815	0.693
$\langle r \rangle$	0.097	0.475	0.441	1.66	1.92
$\langle r^2 \rangle$	0.013	0.268	0.242	3.16	4.33

S<sup>+</sup> \*D

r	1s	2s	2p	3s	3p
0.001	0.123	0.034	0.	0.010	0.
0.002	0.241	0.067	0.001	0.020	0.
0.004	0.467	0.129	0.002	0.039	0.001
0.006	0.679	0.187	0.004	0.057	0.001
0.008	0.876	0.242	0.008	0.073	0.002
0.010	1.061	0.292	0.012	0.088	0.003
0.015	1.470	0.403	0.026	0.122	0.007
0.020	1.809	0.494	0.044	0.149	0.012
0.025	2.089	0.566	0.066	0.171	0.018
0.030	2.316	0.622	0.091	0.187	0.025
0.035	2.496	0.663	0.120	0.199	0.033
0.040	2.636	0.690	0.150	0.207	0.041
0.050	2.814	0.710	0.218	0.212	0.060
0.060	2.885	0.692	0.291	0.206	0.080

r	1s	2s	2p	3s	3p
0.070	2.878	0.643	0.368	0.190	0.100
0.080	2.813	0.572	0.446	0.167	0.122
0.090	2.707	0.483	0.525	0.139	0.143
0.100	2.575	0.381	0.603	0.107	0.164
0.120	2.268	0.154	0.754	0.036	0.203
0.140	1.942	-0.084	0.893	-0.039	0.239
0.160	1.632	-0.318	1.017	-0.111	0.269
0.180	1.352	-0.538	1.125	-0.177	0.294
0.200	1.108	-0.738	1.216	-0.236	0.314
0.220	0.900	-0.914	1.291	-0.286	0.327
0.240	0.726	-1.066	1.350	-0.327	0.336
0.260	0.582	-1.192	1.395	-0.358	0.339
0.280	0.465	-1.295	1.426	-0.380	0.337
0.300	0.370	-1.376	1.445	-0.394	0.332
0.350	0.206	-1.493	1.449	-0.394	0.301
0.400	0.114	-1.514	1.404	-0.354	0.252
0.450	0.063	-1.469	1.328	-0.286	0.190
0.500	0.035	-1.381	1.233	-0.199	0.119
0.550	0.019	-1.268	1.128	-0.101	0.043
0.600	0.011	-1.144	1.019	0.003	-0.034
0.650	0.006	-1.017	0.912	0.108	-0.111
0.700	0.004	-0.894	0.810	0.211	-0.187
0.750	0.002	-0.778	0.714	0.308	-0.259
0.800	0.001	-0.672	0.626	0.398	-0.328
0.850	0.001	-0.576	0.546	0.480	-0.392
0.900	0.001	-0.492	0.474	0.554	-0.450
0.950	0.	-0.417	0.411	0.619	-0.504
1.000	0.	-0.353	0.354	0.675	-0.552
1.100	0.	-0.250	0.261	0.762	-0.632
1.200	0.	-0.175	0.191	0.819	-0.692
1.300	0.	-0.121	0.139	0.849	-0.734
1.400	0.	-0.083	0.101	0.858	-0.760
1.500	-0.	-0.057	0.073	0.849	-0.772
1.600	-0.	-0.039	0.052	0.828	-0.773
1.700	-0.	-0.027	0.038	0.797	-0.765
1.800	-0.	-0.018	0.027	0.759	-0.749
1.900	-0.	-0.013	0.019	0.716	-0.727
2.000	-0.	-0.009	0.014	0.671	-0.701
2.100	-0.	-0.006	0.010	0.625	-0.672
2.200	-0.	-0.004	0.007	0.579	-0.641
2.300	-0.	-0.003	0.005	0.534	-0.608
2.400	-0.	-0.002	0.004	0.490	-0.575
2.500	-0.	-0.002	0.003	0.448	-0.541
2.600	-0.	-0.001	0.002	0.409	-0.508
2.700	-0.	-0.001	0.002	0.371	-0.476
2.800	-0.	-0.001	0.001	0.337	-0.444
2.900	-0.	-0.001	0.001	0.305	-0.414
3.000	-0.	-0.	0.001	0.275	-0.385
3.200	-0.	-0.	0.	0.222	-0.330
3.400	-0.	-0.	0.	0.179	-0.282
3.600	-0.	-0.	0.	0.143	-0.239
3.800	-0.	-0.	0.	0.114	-0.201
4.000	-0.	-0.	0.	0.090	-0.169
4.200	-0.	-0.	0.	0.071	-0.141
4.400	-0.	-0.	0.	0.056	-0.118
4.600	-0.	-0.	0.	0.044	-0.098
4.800	-0.	-0.	0.	0.034	-0.081
5.000	-0.	-0.	0.	0.027	-0.067
5.200	-0.	-0.	0.	0.021	-0.055
5.400	-0.	-0.	0.	0.016	-0.045
5.600	-0.	-0.	0.	0.012	-0.037
5.800	-0.	-0.	0.	0.010	-0.030
6.000	-0.	-0.	0.	0.007	-0.025
6.200	-0.	-0.	0.	0.006	-0.020
6.400	-0.	-0.	0.	0.004	-0.016
6.600	-0.	-0.	0.	0.003	-0.013
6.800	-0.	-0.	0.	0.003	-0.011
7.000	-0.	-0.	0.	0.002	-0.009
7.200	-0.	-0.	0.	0.001	-0.007
7.400	-0.	-0.	0.	0.001	-0.006

r	1s	2s	2p	3s	3p
7.600	-0.	-0.	0.	0.001	-0.005
7.800	-0.	-0.	0.	0.001	-0.004
8.000	-0.	-0.	0.	0.001	-0.003
8.200	-0.	-0.	0.	0.	-0.002
8.400	-0.	-0.	0.	0.	-0.002
8.600	-0.	-0.	0.	0.	-0.002
8.800	-0.	-0.	0.	0.	-0.001
9.000	-0.	-0.	0.	0.	-0.001
9.500	-0.	-0.	0.	0.	-0.001
λ	185.	18.9	14.2	2.50	1.62
⟨r <sup>-2</sup> ⟩	484.	38.5	12.2	3.77	1.07
⟨r <sup>-1</sup> ⟩	15.6	3.07	2.90	0.815	0.698
⟨r⟩	0.097	0.475	0.441	1.66	1.90
⟨r <sup>2</sup> ⟩	0.013	0.268	0.242	3.17	4.25

S<sup>++</sup> 1S

r	1s	2s	2p	3s	3p
0.001	0.123	0.034	0.	0.011	0.
0.002	0.241	0.067	0.001	0.021	0.
0.004	0.467	0.129	0.002	0.041	0.001
0.006	0.679	0.188	0.004	0.059	0.001
0.008	0.876	0.242	0.008	0.076	0.002
0.010	1.061	0.293	0.012	0.092	0.003
0.015	1.470	0.404	0.028	0.127	0.007
0.020	1.810	0.495	0.044	0.156	0.013
0.025	2.089	0.567	0.066	0.178	0.019
0.030	2.316	0.623	0.091	0.196	0.027
0.035	2.496	0.663	0.120	0.208	0.035
0.040	2.636	0.691	0.150	0.217	0.044
0.050	2.814	0.711	0.218	0.222	0.063
0.060	2.885	0.692	0.291	0.215	0.085
0.070	2.878	0.644	0.368	0.199	0.107
0.080	2.813	0.572	0.447	0.175	0.129
0.090	2.707	0.483	0.526	0.145	0.152
0.100	2.575	0.381	0.604	0.111	0.174
0.120	2.268	0.154	0.755	0.037	0.216
0.140	1.942	-0.084	0.894	-0.041	0.253
0.160	1.632	-0.319	1.018	-0.116	0.286
0.180	1.352	-0.539	1.126	-0.186	0.312
0.200	1.108	-0.739	1.217	-0.247	0.332
0.220	0.900	-0.916	1.292	-0.299	0.347
0.240	0.726	-1.067	1.351	-0.342	0.355
0.260	0.582	-1.194	1.395	-0.374	0.358
0.280	0.465	-1.297	1.426	-0.397	0.356
0.300	0.370	-1.377	1.446	-0.411	0.350
0.350	0.206	-1.494	1.449	-0.411	0.316
0.400	0.114	-1.515	1.405	-0.369	0.263
0.450	0.063	-1.470	1.328	-0.297	0.196
0.500	0.035	-1.381	1.233	-0.205	0.119
0.550	0.019	-1.268	1.127	-0.101	0.038
0.600	0.011	-1.143	1.019	0.008	-0.045
0.650	0.008	-1.016	0.912	0.118	-0.127
0.700	0.004	-0.893	0.809	0.225	-0.208
0.750	0.002	-0.777	0.714	0.327	-0.285
0.800	0.001	-0.671	0.625	0.421	-0.357
0.850	0.001	-0.575	0.545	0.506	-0.424
0.900	0.001	-0.490	0.474	0.582	-0.485
0.950	0.	-0.416	0.410	0.649	-0.540
1.000	0.	-0.351	0.353	0.707	-0.589
1.100	0.	-0.248	0.261	0.794	-0.670
1.200	0.	-0.173	0.190	0.849	-0.729

$r$	$1s$	$2s$	$2p$	$3s$	$3p$	$r$	$1s$	$2s$	$2p$	$3s$	$3p$
1.300	0.	-0.120	0.138	0.876	-0.767	0.050	2.814	0.711	0.218	0.221	0.065
1.400	0.	-0.082	0.100	0.880	-0.789	0.060	2.885	0.692	0.291	0.215	0.086
1.500	0.	-0.056	0.072	0.866	-0.796	0.070	2.878	0.644	0.368	0.198	0.109
1.600	-0.	-0.038	0.052	0.839	-0.792	0.080	2.813	0.572	0.446	0.174	0.132
1.700	-0.	-0.026	0.037	0.801	-0.778	0.090	2.707	0.483	0.526	0.145	0.155
1.800	-0.	-0.018	0.027	0.757	-0.756	0.100	2.575	0.381	0.604	0.111	0.178
1.900	-0.	-0.012	0.019	0.709	-0.729	0.120	2.286	0.154	0.755	0.037	0.221
2.000	-0.	-0.008	0.014	0.658	-0.698	0.140	1.942	-0.084	0.894	-0.040	0.259
2.100	-0.	-0.006	0.010	0.607	-0.664	0.160	1.632	-0.319	1.018	-0.116	0.292
2.200	-0.	-0.004	0.007	0.556	-0.628	0.180	1.352	-0.539	1.126	-0.185	0.319
2.300	-0.	-0.003	0.005	0.507	-0.592	0.200	1.108	-0.739	1.217	-0.246	0.340
2.400	-0.	-0.002	0.004	0.461	-0.555	0.220	0.900	-0.915	1.292	-0.299	0.355
2.500	-0.	-0.001	0.003	0.416	-0.519	0.240	0.726	-1.067	1.351	-0.341	0.364
2.600	-0.	-0.001	0.002	0.375	-0.483	0.260	0.582	-1.194	1.395	-0.373	0.367
2.700	-0.	-0.001	0.001	0.337	-0.448	0.280	0.465	-1.296	1.426	-0.396	0.365
2.800	-0.	-0.001	0.001	0.301	-0.415	0.300	0.370	-1.377	1.445	-0.410	0.359
2.900	-0.	0.	0.001	0.269	-0.383	0.350	0.206	-1.494	1.449	-0.410	0.325
3.000	-0.	0.	0.001	0.239	-0.352	0.400	0.114	-1.515	1.405	-0.368	0.271
3.200	-0.	0.	0.	0.188	-0.297	0.450	0.063	-1.469	1.328	-0.296	0.203
3.400	-0.	0.	0.	0.147	-0.248	0.500	0.035	-1.381	1.233	-0.205	0.126
3.600	-0.	0.	0.	0.114	-0.206	0.550	0.019	-1.268	1.128	-0.101	0.043
3.800	-0.	0.	0.	0.088	-0.170	0.600	0.011	-1.143	1.019	0.008	-0.042
4.000	-0.	0.	0.	0.067	-0.139	0.650	0.006	-1.016	0.912	0.118	-0.126
4.200	-0.	0.	0.	0.051	-0.114	0.700	0.004	-0.893	0.809	0.224	-0.208
4.400	-0.	0.	0.	0.039	-0.092	0.750	0.002	-0.777	0.714	0.325	-0.287
4.600	-0.	0.	0.	0.029	-0.075	0.800	0.001	-0.671	0.626	0.419	-0.361
4.800	-0.	0.	0.	0.022	-0.060	0.850	0.001	-0.575	0.546	0.505	-0.429
5.000	-0.	0.	0.	0.017	-0.049	0.900	0.001	-0.491	0.474	0.581	-0.492
5.200	-0.	0.	0.	0.012	-0.039	0.950	0.	-0.416	0.410	0.647	-0.549
5.400	-0.	0.	0.	0.009	-0.031	1.000	0.	-0.352	0.353	0.705	-0.600
5.600	-0.	0.	0.	0.007	-0.025	1.100	0.	-0.248	0.261	0.793	-0.684
5.800	-0.	0.	0.	0.005	-0.020	1.200	0.	-0.173	0.191	0.848	-0.745
6.000	-0.	0.	0.	0.004	-0.016	1.300	0.	-0.120	0.138	0.875	-0.785
6.200	-0.	0.	0.	0.003	-0.012	1.400	0.	-0.082	0.100	0.879	-0.808
6.400	-0.	0.	0.	0.002	-0.010	1.500	0.	-0.056	0.072	0.866	-0.814
6.600	-0.	0.	0.	0.002	-0.008	1.600	-0.	-0.039	0.052	0.839	-0.808
6.800	-0.	0.	0.	0.001	-0.006	1.700	-0.	-0.026	0.037	0.802	-0.792
7.000	-0.	0.	0.	0.001	-0.005	1.800	-0.	-0.018	0.027	0.758	-0.767
7.200	-0.	0.	0.	0.001	-0.004	1.900	-0.	-0.012	0.019	0.710	-0.737
7.400	-0.	0.	0.	0.	-0.003	2.000	-0.	-0.008	0.014	0.659	-0.702
7.600	-0.	0.	0.	0.	-0.002	2.100	-0.	-0.006	0.010	0.608	-0.665
7.800	-0.	0.	0.	0.	-0.002	2.200	-0.	-0.004	0.007	0.558	-0.625
8.000	-0.	0.	0.	0.	-0.001	2.300	-0.	-0.003	0.005	0.509	-0.585
8.200	-0.	0.	0.	0.	-0.001	2.400	-0.	-0.002	0.004	0.462	-0.544
8.400	-0.	0.	0.	0.	-0.001	2.500	-0.	-0.001	0.003	0.418	-0.505
8.600	-0.	0.	0.	0.	-0.001	2.600	-0.	-0.001	0.002	0.377	-0.466
8.800	-0.	0.	0.	0.	-0.001	2.700	-0.	-0.001	0.001	0.338	-0.429
$\lambda$	186.	20.0	15.3	3.34	2.24	2.800	-0.	-0.001	0.001	0.303	-0.394
$\langle r^{-2} \rangle$	484.	38.6	12.2	4.10	1.18	2.900	-0.	0.	0.001	0.270	-0.360
$\langle r^{-1} \rangle$	15.6	3.08	2.96	0.847	0.732	3.000	-0.	0.	0.001	0.240	-0.328
$\langle r \rangle$	0.097	0.475	0.440	1.59	1.82	3.200	-0.	0.	0.	0.189	-0.271
$\langle r^2 \rangle$	0.013	0.267	0.241	2.91	3.85	3.400	-0.	0.	0.	0.148	-0.222
<b>S<sup>++</sup> 3P</b>											
$r$	$1s$	$2s$	$2p$	$3s$	$3p$	$r$	$1s$	$2s$	$2p$	$3s$	$3p$
0.001	0.123	0.034	0.	0.011	0.	3.600	-0.	0.	0.	0.114	-0.181
0.002	0.241	0.067	0.001	0.021	0.	3.800	-0.	0.	0.	0.088	-0.146
0.004	0.467	0.129	0.002	0.041	0.001	4.000	-0.	0.	0.	0.067	-0.117
0.006	0.679	0.188	0.004	0.059	0.001	4.200	-0.	0.	0.	0.051	-0.094
0.008	0.876	0.242	0.008	0.076	0.002	4.400	-0.	0.	0.	0.039	-0.074
0.010	1.061	0.293	0.012	0.092	0.004	4.600	-0.	0.	0.	0.029	-0.059
0.015	1.470	0.404	0.026	0.127	0.008	4.800	-0.	0.	0.	0.022	-0.047
0.020	1.810	0.495	0.044	0.155	0.013	5.000	-0.	0.	0.	0.017	-0.037
0.025	2.089	0.567	0.066	0.178	0.020	5.200	-0.	0.	0.	0.012	-0.029
0.030	2.316	0.623	0.091	0.195	0.027	5.400	-0.	0.	0.	0.009	-0.022
0.035	2.496	0.663	0.120	0.208	0.036	5.600	-0.	0.	0.	0.007	-0.017
0.040	2.636	0.691	0.150	0.216	0.045	5.800	-0.	0.	0.	0.005	-0.014
						6.000	-0.	0.	0.	0.004	-0.011
						6.200	-0.	0.	0.	0.003	-0.008
						6.400	-0.	0.	0.	0.002	-0.006
						6.600	-0.	0.	0.	0.002	-0.005
						6.800	-0.	0.	0.	0.001	-0.004
						7.000	-0.	0.	0.	0.001	-0.003
						7.200	-0.	0.	0.	0.001	-0.002



r	1s	2s	2p	3s	3p
7.400	-0.	-0.	0.	0.	-0.002
7.600	-0.	-0.	0.	0.	-0.001
7.800	-0.	-0.	0.	0.	-0.001
8.000	-0.	-0.	0.	0.	-0.001
8.200	-0.	-0.	0.	0.	-0.001

$\lambda$	186.	19.9	15.3	3.32	2.54
$\langle r^{-2} \rangle$	484.	38.6	12.2	4.08	1.23
$\langle r^{-1} \rangle$	15.6	3.08	2.96	0.845	0.748
$\langle r \rangle$	0.097	0.475	0.440	1.60	1.77
$\langle r^2 \rangle$	0.013	0.268	0.241	2.92	3.62

### S<sup>++</sup> 1D

r	1s	2s	2p	3s	3p
0.001	0.123	0.034	0.	0.011	0.
0.002	0.241	0.067	0.001	0.021	0.
0.004	0.467	0.129	0.002	0.041	0.001
0.006	0.679	0.188	0.004	0.059	0.001
0.008	0.876	0.242	0.008	0.076	0.002
0.010	1.061	0.293	0.012	0.092	0.004
0.015	1.470	0.404	0.026	0.127	0.008
0.020	1.810	0.495	0.044	0.155	0.013
0.025	2.089	0.567	0.066	0.178	0.019
0.030	2.316	0.623	0.091	0.195	0.027
0.035	2.496	0.663	0.120	0.208	0.035
0.040	2.636	0.691	0.150	0.216	0.044
0.050	2.814	0.711	0.218	0.222	0.064
0.060	2.885	0.692	0.291	0.215	0.086
0.070	2.878	0.644	0.368	0.198	0.108
0.080	2.813	0.572	0.446	0.174	0.131
0.090	2.707	0.483	0.526	0.145	0.154
0.100	2.575	0.381	0.604	0.111	0.176

$\lambda$	186.	19.9	15.3	3.32	2.42
$\langle r^{-2} \rangle$	484.	38.6	12.2	4.09	1.21
$\langle r^{-1} \rangle$	15.6	3.08	2.96	0.846	0.742
$\langle r \rangle$	0.097	0.475	0.440	1.60	1.79
$\langle r^2 \rangle$	0.013	0.268	0.241	2.92	3.71

### Cl <sup>2</sup>P

r	1s	2s	2p	3s	3p
2.000	-0.	-0.008	0.014	0.659	-0.701
2.100	-0.	-0.006	0.010	0.608	-0.665
2.200	-0.	-0.004	0.007	0.557	-0.627
2.300	-0.	-0.003	0.005	0.508	-0.588
2.400	-0.	-0.002	0.004	0.462	-0.549
2.500	-0.	-0.001	0.003	0.417	-0.511
2.600	-0.	-0.001	0.002	0.376	-0.473
2.700	-0.	-0.001	0.001	0.338	-0.437
2.800	-0.	-0.001	0.001	0.302	-0.402
2.900	-0.	-0.	0.001	0.270	-0.369
3.000	-0.	-0.	0.001	0.240	-0.338
3.200	-0.	-0.	0.	0.189	-0.282
3.400	-0.	-0.	0.	0.147	-0.232
3.600	-0.	-0.	0.	0.114	-0.191
3.800	-0.	-0.	0.	0.088	-0.155
4.000	-0.	-0.	0.	0.067	-0.126
4.200	-0.	-0.	0.	0.051	-0.101
4.400	-0.	-0.	0.	0.039	-0.081
4.600	-0.	-0.	0.	0.029	-0.065
4.800	-0.	-0.	0.	0.022	-0.052
5.000	-0.	-0.	0.	0.017	-0.041
5.200	-0.	-0.	0.	0.012	-0.032
5.400	-0.	-0.	0.	0.009	-0.026
5.600	-0.	-0.	0.	0.007	-0.020
5.800	-0.	-0.	0.	0.005	-0.016
6.000	-0.	-0.	0.	0.004	-0.012
6.200	-0.	-0.	0.	0.003	-0.010
6.400	-0.	-0.	0.	0.002	-0.007
6.600	-0.	-0.	0.	0.002	-0.006
6.800	-0.	-0.	0.	0.001	-0.005
7.000	-0.	-0.	0.	0.001	-0.003
7.200	-0.	-0.	0.	0.001	-0.003
7.400	-0.	-0.	0.	0.	-0.002
7.600	-0.	-0.	0.	0.	-0.002
7.800	-0.	-0.	0.	0.	-0.001
8.000	-0.	-0.	0.	0.	-0.001
8.200	-0.	-0.	0.	0.	-0.001
8.400	-0.	-0.	0.	0.	-0.001

$\lambda$	186.	19.9	15.3	3.32	2.42
$\langle r^{-2} \rangle$	484.	38.6	12.2	4.09	1.21
$\langle r^{-1} \rangle$	15.6	3.08	2.96	0.846	0.742
$\langle r \rangle$	0.097	0.475	0.440	1.60	1.79
$\langle r^2 \rangle$	0.013	0.268	0.241	2.92	3.71

r	1s	2s	2p	3s	3p
0.001	0.134	0.038	0.	0.011	0.
0.002	0.264	0.074	0.001	0.022	0.
0.004	0.510	0.143	0.002	0.043	0.001
0.006	0.740	0.207	0.005	0.063	0.001
0.008	0.953	0.267	0.009	0.081	0.002
0.010	1.152	0.322	0.014	0.097	0.004
0.015	1.588	0.442	0.031	0.134	0.008
0.020	1.945	0.538	0.052	0.162	0.014
0.025	2.235	0.613	0.078	0.185	0.021
0.030	2.465	0.669	0.108	0.202	0.029
0.035	2.644	0.708	0.141	0.213	0.038
0.040	2.778	0.731	0.177	0.220	0.047
0.050	2.937	0.740	0.255	0.222	0.068
0.060	2.982	0.707	0.339	0.210	0.090
0.070	2.945	0.641	0.426	0.189	0.113
0.080	2.850	0.551	0.515	0.160	0.136
0.090	2.717	0.443	0.604	0.126	0.159
0.100	2.559	0.324	0.690	0.088	0.182
0.120	2.209	0.064	0.855	0.006	0.223
0.140	1.857	-0.202	1.004	-0.076	0.259

$r$	$1s$	$2s$	$2p$	$3s$	$3p$
0.160	1.531	-0.456	1.134	-0.154	0.289
0.180	1.245	-0.689	1.243	-0.223	0.312
0.200	1.001	-0.895	1.333	-0.283	0.329
0.220	0.798	-1.072	1.403	-0.331	0.339
0.240	0.632	-1.219	1.454	-0.368	0.343
0.260	0.497	-1.337	1.490	-0.394	0.341
0.280	0.390	-1.429	1.511	-0.409	0.334
0.300	0.305	-1.496	1.518	-0.415	0.322
0.350	0.163	-1.573	1.492	-0.392	0.270
0.400	0.086	-1.553	1.417	-0.328	0.212
0.450	0.046	-1.469	1.313	-0.236	0.135
0.500	0.024	-1.349	1.195	-0.128	0.052
0.550	0.013	-1.211	1.071	-0.011	-0.034
0.600	0.007	-1.068	0.948	0.107	-0.119
0.650	0.004	-0.929	0.831	0.222	-0.202
0.700	0.002	-0.799	0.723	0.331	-0.281
0.750	0.001	-0.681	0.624	0.430	-0.355
0.800	0.001	-0.576	0.536	0.520	-0.423
0.850	0.001	-0.484	0.458	0.599	-0.484
0.900	0.	-0.404	0.390	0.667	-0.539
0.950	0.	-0.336	0.331	0.725	-0.587
1.000	0.	-0.279	0.279	0.772	-0.629
1.100	0.	-0.189	0.198	0.839	-0.695
1.200	0.	-0.128	0.139	0.873	-0.740
1.300	-0.	-0.085	0.098	0.882	-0.766
1.400	-0.	-0.057	0.068	0.870	-0.777
1.500	-0.	-0.038	0.047	0.845	-0.776
1.600	-0.	-0.025	0.033	0.809	-0.765
1.700	-0.	-0.017	0.023	0.766	-0.748
1.800	-0.	-0.012	0.016	0.719	-0.724
1.900	-0.	-0.008	0.011	0.670	-0.697
2.000	-0.	-0.005	0.008	0.620	-0.667
2.100	-0.	-0.004	0.006	0.572	-0.636
2.200	-0.	-0.003	0.004	0.525	-0.603
2.300	-0.	-0.002	0.003	0.480	-0.571
2.400	-0.	-0.002	0.002	0.437	-0.538
2.500	-0.	-0.001	0.002	0.397	-0.506
2.600	-0.	-0.001	0.001	0.360	-0.475
2.700	-0.	-0.001	0.001	0.326	-0.445
2.800	-0.	-0.001	0.001	0.294	-0.416
2.900	-0.	0.	0.	0.265	-0.389
3.000	-0.	0.	0.	0.239	-0.363
3.200	-0.	0.	0.	0.192	-0.314
3.400	-0.	0.	0.	0.155	-0.271
3.600	-0.	0.	0.	0.124	-0.233
3.800	-0.	0.	0.	0.099	-0.200
4.000	-0.	0.	0.	0.078	-0.171
4.200	-0.	0.	0.	0.062	-0.146
4.400	-0.	0.	0.	0.049	-0.124
4.600	-0.	0.	0.	0.039	-0.106
4.800	-0.	0.	0.	0.031	-0.090
5.000	-0.	0.	0.	0.024	-0.076
5.200	-0.	0.	0.	0.019	-0.064
5.400	-0.	0.	0.	0.015	-0.054
5.600	-0.	0.	0.	0.012	-0.046
5.800	-0.	0.	0.	0.009	-0.039
6.000	-0.	0.	0.	0.007	-0.033
6.200	-0.	0.	0.	0.006	-0.027
6.400	-0.	0.	0.	0.004	-0.023
6.600	-0.	0.	0.	0.003	-0.019
6.800	-0.	0.	0.	0.003	-0.016
7.000	-0.	0.	0.	0.002	-0.014
7.200	-0.	0.	0.	0.002	-0.011
7.400	-0.	0.	0.	0.001	-0.010
7.600	-0.	0.	0.	0.001	-0.008
7.800	-0.	0.	0.	0.001	-0.007
8.000	-0.	0.	0.	0.001	-0.006
8.200	-0.	0.	0.	0.	-0.005
8.400	-0.	0.	0.	0.	-0.004
8.600	-0.	0.	0.	0.	-0.003
8.800	-0.	0.	0.	0.	-0.003
9.000	-0.	0.	0.	0.	-0.002

$r$	$1s$	$2s$	$2p$	$3s$	$3p$
9.500	-0.	-0.	0.	0.	-0.001
10.000	-0.	-0.	0.	0.	-0.001
10.500	-0.	-0.	0.	0.	-0.001
$\lambda$	210.	21.2	16.1	2.15	1.01
$\langle r^{-2} \rangle$	547.	44.7	14.3	4.39	1.19
$\langle r^{-1} \rangle$	16.6	3.31	3.20	0.875	0.732
$\langle r \rangle$	0.091	0.442	0.405	1.56	1.84
$\langle r^2 \rangle$	0.011	0.231	0.204	2.81	4.06

**Cl<sup>+</sup> 1S**

$r$	$1s$	$2s$	$2p$	$3s$	$3p$
0.001	0.134	0.038	0.	0.012	0.
0.002	0.264	0.074	0.001	0.023	0.
0.004	0.510	0.143	0.002	0.045	0.001
0.006	0.740	0.207	0.005	0.065	0.002
0.008	0.953	0.267	0.009	0.084	0.003
0.010	1.152	0.322	0.014	0.101	0.004
0.015	1.588	0.442	0.031	0.138	0.009
0.020	1.945	0.538	0.052	0.168	0.015
0.025	2.235	0.613	0.078	0.192	0.022
0.030	2.465	0.669	0.108	0.209	0.031
0.035	2.644	0.708	0.141	0.221	0.040
0.040	2.778	0.732	0.177	0.228	0.050
0.050	2.937	0.740	0.255	0.230	0.072
0.060	2.982	0.707	0.339	0.218	0.096
0.070	2.945	0.641	0.426	0.196	0.121
0.080	2.851	0.551	0.515	0.166	0.145
0.090	2.717	0.444	0.604	0.130	0.170
0.100	2.559	0.324	0.691	0.091	0.193
0.120	2.209	0.064	0.855	0.007	0.238
0.140	1.857	-0.202	1.004	-0.079	0.276
0.160	1.531	-0.456	1.134	-0.160	0.308
0.180	1.245	-0.690	1.243	-0.232	0.332
0.200	1.001	-0.896	1.333	-0.293	0.350
0.220	0.798	-1.073	1.403	-0.343	0.360
0.240	0.632	-1.220	1.455	-0.382	0.364
0.260	0.497	-1.338	1.490	-0.408	0.362
0.280	0.390	-1.430	1.511	-0.424	0.354
0.300	0.305	-1.496	1.518	-0.429	0.342
0.350	0.163	-1.574	1.492	-0.405	0.292
0.400	0.086	-1.553	1.417	-0.338	0.222
0.450	0.046	-1.469	1.313	-0.243	0.140
0.500	0.024	-1.349	1.195	-0.130	0.051
0.550	0.013	-1.210	1.070	-0.008	-0.041
0.600	0.007	-1.067	0.948	0.114	-0.133
0.650	0.004	-0.928	0.831	0.234	-0.221
0.700	0.002	-0.798	0.723	0.346	-0.305
0.750	0.001	-0.680	0.624	0.449	-0.383
0.800	0.001	-0.575	0.536	0.542	-0.455
0.850	0.001	-0.483	0.458	0.623	-0.519
0.900	0.	-0.403	0.390	0.693	-0.577
0.950	0.	-0.335	0.331	0.751	-0.627
1.000	0.	-0.278	0.279	0.799	-0.670
1.100	0.	-0.189	0.198	0.864	-0.736
1.200	0.	-0.127	0.139	0.896	-0.779
1.300	-0.	-0.085	0.097	0.902	-0.802
1.400	-0.	-0.057	0.068	0.886	-0.809
1.500	-0.	-0.038	0.047	0.855	-0.803
1.600	-0.	-0.025	0.033	0.814	-0.786
1.700	-0.	-0.017	0.023	0.765	-0.763
1.800	-0.	-0.012	0.016	0.713	-0.733



r	1s	2s	2p	3s	3p
7.400	-0.	-0.	0.	0.	-0.003
7.600	-0.	-0.	0.	0.	-0.002
7.800	-0.	-0.	0.	0.	-0.002
8.000	-0.	-0.	0.	0.	-0.001
8.200	-0.	-0.	0.	0.	-0.001
8.400	-0.	-0.	0.	0.	-0.001
8.600	-0.	-0.	0.	0.	-0.001
8.800	-0.	-0.	0.	0.	-0.001
$\lambda$	211.	22.2	17.1	2.94	1.88
$\langle r^{-2} \rangle$	547.	44.7	14.3	4.67	1.35
$\langle r^{-1} \rangle$	16.8	3.32	3.20	0.902	0.782
$\langle r \rangle$	0.091	0.441	0.405	1.51	1.71
$\langle r^2 \rangle$	0.011	0.231	0.204	2.62	3.43

### Cl<sup>+</sup> 1D

r	1s	2s	2p	3s	3p
0.001	0.134	0.038	0.	0.012	0.
0.002	0.264	0.074	0.001	0.023	0.
0.004	0.510	0.143	0.002	0.045	0.001
0.006	0.740	0.207	0.005	0.065	0.002
0.008	0.953	0.267	0.009	0.083	0.003
0.010	1.152	0.322	0.014	0.101	0.004
0.015	1.588	0.442	0.031	0.138	0.009
0.020	1.945	0.538	0.052	0.168	0.015
0.025	2.235	0.613	0.078	0.191	0.022
0.030	2.465	0.669	0.108	0.209	0.031
0.035	2.644	0.708	0.141	0.220	0.040
0.040	2.778	0.732	0.177	0.227	0.051
0.050	2.937	0.740	0.255	0.229	0.073
0.060	2.982	0.707	0.339	0.217	0.097
0.070	2.945	0.641	0.426	0.195	0.121
0.080	2.851	0.551	0.515	0.166	0.146
0.090	2.717	0.444	0.604	0.130	0.171
0.100	2.559	0.324	0.691	0.091	0.195
0.120	2.209	0.064	0.855	0.007	0.239
0.140	1.857	-0.202	1.004	-0.079	0.278
0.160	1.531	-0.456	1.134	-0.159	0.310
0.180	1.245	-0.690	1.243	-0.231	0.335
0.200	1.001	-0.896	1.333	-0.293	0.352
0.220	0.798	-1.073	1.403	-0.343	0.363
0.240	0.632	-1.220	1.455	-0.381	0.367
0.260	0.497	-1.338	1.490	-0.407	0.365
0.280	0.390	-1.429	1.511	-0.423	0.357
0.300	0.305	-1.496	1.518	-0.429	0.344
0.350	0.163	-1.573	1.491	-0.405	0.294
0.400	0.086	-1.553	1.417	-0.338	0.225
0.450	0.046	-1.469	1.313	-0.243	0.142
0.500	0.024	-1.349	1.195	-0.130	0.052
0.550	0.013	-1.210	1.070	-0.009	-0.040
0.600	0.007	-1.067	0.948	0.114	-0.132
0.650	0.004	-0.928	0.831	0.233	-0.221
0.700	0.002	-0.798	0.723	0.345	-0.306
0.750	0.001	-0.680	0.624	0.448	-0.385
0.800	0.001	-0.575	0.536	0.541	-0.457
0.850	0.001	-0.483	0.458	0.622	-0.522
0.900	0.	-0.403	0.390	0.691	-0.579
0.950	0.	-0.335	0.331	0.750	-0.630
1.000	0.	-0.278	0.279	0.797	-0.673
1.100	0.	-0.189	0.198	0.863	-0.741
1.200	0.	-0.127	0.139	0.896	-0.784
1.300	-0.	-0.085	0.097	0.901	-0.808

r	1s	2s	2p	3s	3p
1.400	-0.	-0.057	0.068	0.885	-0.814
1.500	-0.	-0.038	0.047	0.855	-0.808
1.600	-0.	-0.025	0.033	0.814	-0.791
1.700	-0.	-0.017	0.023	0.766	-0.766
1.800	-0.	-0.011	0.016	0.714	-0.736
1.900	-0.	-0.008	0.011	0.660	-0.702
2.000	-0.	-0.005	0.008	0.607	-0.665
2.100	-0.	-0.004	0.005	0.554	-0.627
2.200	-0.	-0.003	0.004	0.504	-0.589
2.300	-0.	-0.002	0.003	0.456	-0.550
2.400	-0.	-0.001	0.002	0.411	-0.512
2.500	-0.	-0.001	0.001	0.370	-0.476
2.600	-0.	-0.001	0.001	0.331	-0.440
2.700	-0.	-0.001	0.001	0.296	-0.407
2.800	-0.	-0.	0.001	0.264	-0.375
2.900	-0.	-0.	0.	0.235	-0.345
3.000	-0.	-0.	0.	0.209	-0.316
3.200	-0.	-0.	0.	0.164	-0.265
3.400	-0.	-0.	0.	0.128	-0.221
3.600	-0.	-0.	0.	0.099	-0.183
3.800	-0.	-0.	0.	0.076	-0.151
4.000	-0.	-0.	0.	0.059	-0.124
4.200	-0.	-0.	0.	0.045	-0.101
4.400	-0.	-0.	0.	0.034	-0.083
4.600	-0.	-0.	0.	0.026	-0.067
4.800	-0.	-0.	0.	0.020	-0.055
5.000	-0.	-0.	0.	0.015	-0.044
5.200	-0.	-0.	0.	0.011	-0.036
5.400	-0.	-0.	0.	0.009	-0.029
5.600	-0.	-0.	0.	0.006	-0.023
5.800	-0.	-0.	0.	0.005	-0.019
6.000	-0.	-0.	0.	0.004	-0.015
6.200	-0.	-0.	0.	0.003	-0.012
6.400	-0.	-0.	0.	0.002	-0.010
6.600	-0.	-0.	0.	0.002	-0.008
6.800	-0.	-0.	0.	0.001	-0.006
7.000	-0.	-0.	0.	0.001	-0.005
7.200	-0.	-0.	0.	0.001	-0.004
7.400	-0.	-0.	0.	0.	-0.003
7.600	-0.	-0.	0.	0.	-0.002
7.800	-0.	-0.	0.	0.	-0.002
8.000	-0.	-0.	0.	0.	-0.002
8.200	-0.	-0.	0.	0.	-0.001
8.400	-0.	-0.	0.	0.	-0.001
8.600	-0.	-0.	0.	0.	-0.001
8.800	-0.	-0.	0.	0.	-0.001

$\lambda$	211.	22.2	17.1	2.95	1.82
$\langle r^{-2} \rangle$	547.	44.8	14.3	4.68	1.34
$\langle r^{-1} \rangle$	16.8	3.32	3.20	0.902	0.778
$\langle r \rangle$	0.091	0.441	0.405	1.51	1.72
$\langle r^2 \rangle$	0.011	0.231	0.204	2.61	3.47

### Cl<sup>++</sup> 4S

r	1s	2s	2p	3s	3p
0.001	0.134	0.038	0.	0.012	0.
0.002	0.264	0.074	0.001	0.024	0.
0.004	0.510	0.143	0.002	0.046	0.001
0.006	0.740	0.207	0.005	0.067	0.002
0.008	0.953	0.267	0.009	0.086	0.003
0.010	1.152	0.322	0.014	0.104	0.004
0.015	1.588	0.442	0.031	0.143	0.009
0.020	1.945	0.539	0.052	0.174	0.016

r	1s	2s	2p	3s	3p
0.025	2.235	0.613	0.078	0.198	0.024
0.030	2.465	0.669	0.108	0.216	0.033
0.035	2.644	0.708	0.141	0.228	0.044
0.040	2.778	0.732	0.177	0.236	0.055
0.050	2.937	0.741	0.255	0.237	0.079
0.060	2.982	0.708	0.339	0.225	0.104
0.070	2.945	0.642	0.427	0.202	0.131
0.080	2.851	0.552	0.515	0.171	0.158
0.090	2.717	0.444	0.604	0.135	0.184
0.100	2.559	0.324	0.691	0.094	0.210
0.120	2.209	0.064	0.856	0.007	0.258
0.140	1.857	-0.202	1.005	-0.082	0.300
0.160	1.531	-0.457	1.134	-0.165	0.334
0.180	1.245	-0.690	1.244	-0.240	0.361
0.200	1.001	-0.897	1.333	-0.303	0.380
0.220	0.798	-1.074	1.403	-0.355	0.391
0.240	0.631	-1.221	1.455	-0.394	0.395
0.260	0.497	-1.339	1.491	-0.422	0.393
0.280	0.390	-1.430	1.511	-0.438	0.384
0.300	0.305	-1.497	1.519	-0.444	0.370
0.350	0.163	-1.574	1.492	-0.418	0.316
0.400	0.086	-1.554	1.417	-0.348	0.240
0.450	0.046	-1.470	1.313	-0.249	0.151
0.500	0.024	-1.349	1.194	-0.131	0.054
0.550	0.013	-1.210	1.070	-0.005	-0.046
0.600	0.007	-1.067	0.948	0.122	-0.146
0.650	0.004	-0.927	0.831	0.246	-0.242
0.700	0.002	-0.797	0.722	0.362	-0.333
0.750	0.001	-0.679	0.624	0.468	-0.418
0.800	0.001	-0.574	0.536	0.563	-0.495
0.850	0.001	-0.482	0.458	0.640	-0.564
0.900	0.	-0.402	0.389	0.717	-0.626
0.950	0.	-0.334	0.330	0.777	-0.679
1.000	0.	-0.277	0.279	0.824	-0.725
1.100	0.	-0.188	0.197	0.889	-0.793
1.200	0.	-0.126	0.139	0.918	-0.835
1.300	0.	-0.084	0.097	0.919	-0.855
1.400	-0.	-0.056	0.067	0.899	-0.855
1.500	-0.	-0.037	0.047	0.863	-0.841
1.600	-0.	-0.024	0.032	0.816	-0.815
1.700	-0.	-0.016	0.022	0.762	-0.780
1.800	-0.	-0.011	0.016	0.705	-0.740
1.900	-0.	-0.007	0.011	0.646	-0.696
2.000	-0.	-0.005	0.008	0.588	-0.650
2.100	-0.	-0.003	0.005	0.532	-0.603
2.200	-0.	-0.002	0.004	0.479	-0.557
2.300	-0.	-0.002	0.003	0.429	-0.511
2.400	-0.	-0.001	0.002	0.382	-0.468
2.500	-0.	-0.001	0.001	0.340	-0.426
2.600	-0.	-0.001	0.001	0.301	-0.386
2.700	-0.	-0.	0.001	0.265	-0.350
2.800	-0.	-0.	0.001	0.233	-0.315
2.900	-0.	-0.	0.	0.205	-0.284
3.000	-0.	-0.	0.	0.179	-0.254
3.200	-0.	-0.	0.	0.136	-0.203
3.400	-0.	-0.	0.	0.103	-0.161
3.600	-0.	-0.	0.	0.077	-0.127
3.800	-0.	-0.	0.	0.058	-0.100
4.000	-0.	-0.	0.	0.043	-0.078
4.200	-0.	-0.	0.	0.031	-0.060
4.400	-0.	-0.	0.	0.023	-0.046
4.600	-0.	-0.	0.	0.017	-0.036
4.800	-0.	-0.	0.	0.012	-0.027
5.000	-0.	-0.	0.	0.009	-0.021
5.200	-0.	-0.	0.	0.007	-0.016
5.400	-0.	-0.	0.	0.005	-0.012
5.600	-0.	-0.	0.	0.003	-0.009
5.800	-0.	-0.	0.	0.002	-0.007
6.000	-0.	-0.	0.	0.002	-0.005

r	1s	2s	2p	3s	3p
6.200	-0.	-0.	0.	0.001	-0.004
6.400	-0.	-0.	0.	0.001	-0.003
6.600	-0.	-0.	0.	0.001	-0.002
6.800	-0.	-0.	0.	0.	-0.002
7.000	-0.	-0.	0.	0.	-0.001
7.200	-0.	-0.	0.	0.	-0.001
7.400	-0.	-0.	0.	0.	-0.001
7.600	-0.	-0.	0.	0.	-0.001
$\lambda$	212.	23.2	18.2	3.83	2.92
$\langle r^{-2} \rangle$	547.	44.8	14.3	5.00	1.52
$\langle r^{-1} \rangle$	16.6	3.32	3.20	0.931	0.833
$\langle r \rangle$	0.091	0.441	0.403	1.46	1.60
$\langle r^2 \rangle$	0.011	0.230	0.204	2.44	2.96

**Cl<sup>++</sup> 2P**

r	1s	2s	2p	3s	3p
0.001	0.134	0.038	0.	0.012	0.
0.002	0.264	0.074	0.001	0.024	0.
0.004	0.510	0.143	0.002	0.046	0.001
0.006	0.740	0.207	0.005	0.067	0.002
0.008	0.953	0.267	0.009	0.087	0.003
0.010	1.152	0.322	0.014	0.104	0.004
0.015	1.588	0.442	0.031	0.143	0.009
0.020	1.945	0.539	0.052	0.174	0.016
0.025	2.235	0.614	0.078	0.199	0.024
0.030	2.465	0.670	0.108	0.216	0.033
0.035	2.644	0.708	0.141	0.229	0.043
0.040	2.778	0.732	0.177	0.236	0.054
0.050	2.937	0.741	0.255	0.238	0.078
0.060	2.982	0.708	0.339	0.226	0.103
0.070	2.945	0.642	0.427	0.203	0.129
0.080	2.851	0.552	0.516	0.172	0.156
0.090	2.717	0.444	0.604	0.135	0.182
0.100	2.559	0.324	0.691	0.094	0.207
0.120	2.209	0.064	0.856	0.007	0.255
0.140	1.857	-0.202	1.005	-0.082	0.296
0.160	1.531	-0.457	1.135	-0.166	0.330
0.180	1.245	-0.690	1.244	-0.240	0.356
0.200	1.001	-0.897	1.333	-0.304	0.375
0.220	0.798	-1.074	1.403	-0.356	0.386
0.240	0.631	-1.221	1.455	-0.395	0.390
0.260	0.497	-1.339	1.491	-0.423	0.387
0.280	0.390	-1.431	1.511	-0.439	0.379
0.300	0.305	-1.497	1.519	-0.444	0.365
0.350	0.163	-1.574	1.492	-0.419	0.311
0.400	0.086	-1.554	1.417	-0.349	0.235
0.450	0.046	-1.470	1.313	-0.249	0.147
0.500	0.024	-1.349	1.194	-0.131	0.051
0.550	0.013	-1.210	1.070	-0.005	-0.049
0.600	0.007	-1.067	0.948	0.123	-0.147
0.650	0.004	-0.927	0.831	0.247	-0.242
0.700	0.002	-0.797	0.722	0.363	-0.332
0.750	0.001	-0.679	0.624	0.469	-0.415
0.800	0.001	-0.574	0.536	0.565	-0.491
0.850	0.001	-0.482	0.458	0.648	-0.559
0.900	0.	-0.402	0.389	0.719	-0.620
0.950	0.	-0.334	0.330	0.778	-0.672
1.000	0.	-0.277	0.279	0.826	-0.716
1.100	0.	-0.188	0.197	0.890	-0.783
1.200	0.	-0.126	0.139	0.919	-0.824

r	1s	2s	2p	3s	3p	r	1s	2s	2p	3s	3p
1.300	0.	-0.084	0.097	0.920	-0.843	0.070	2.945	0.642	0.427	0.203	0.130
1.400	-0.	-0.056	0.067	0.899	-0.844	0.080	2.851	0.552	0.516	0.172	0.157
1.500	-0.	-0.037	0.047	0.862	-0.831	0.090	2.717	0.444	0.604	0.135	0.183
1.600	-0.	-0.024	0.032	0.815	-0.807	0.100	2.559	0.324	0.691	0.094	0.208
1.700	-0.	-0.016	0.022	0.761	-0.775	0.120	2.209	0.064	0.856	0.007	0.256
1.800	-0.	-0.011	0.016	0.704	-0.738	0.140	1.857	-0.202	1.005	-0.082	0.298
1.900	-0.	-0.007	0.011	0.645	-0.696	0.160	1.531	-0.457	1.134	-0.165	0.332
2.000	-0.	-0.005	0.008	0.587	-0.653	0.180	1.245	-0.690	1.244	-0.240	0.358
2.100	-0.	-0.003	0.005	0.531	-0.608	0.200	1.001	-0.897	1.333	-0.304	0.377
2.200	-0.	-0.002	0.004	0.478	-0.564	0.220	0.798	-1.074	1.403	-0.350	0.388
2.300	-0.	-0.002	0.003	0.428	-0.521	0.240	0.631	-1.221	1.455	-0.395	0.392
2.400	-0.	-0.001	0.002	0.381	-0.479	0.260	0.497	-1.339	1.491	-0.422	0.389
2.500	-0.	-0.001	0.001	0.338	-0.438	0.280	0.390	-1.430	1.511	-0.438	0.381
2.600	-0.	-0.001	0.001	0.300	-0.400	0.300	0.305	-1.497	1.519	-0.444	0.367
2.700	-0.	-0.	0.001	0.264	-0.364	0.350	0.163	-1.574	1.492	-0.418	0.313
2.800	-0.	-0.	0.001	0.232	-0.331	0.400	0.086	-1.554	1.417	-0.349	0.237
2.900	-0.	-0.	0.	0.204	-0.299	0.450	0.046	-1.470	1.313	-0.249	0.148
3.000	-0.	-0.	0.	0.178	-0.270	0.500	0.024	-1.349	1.194	-0.131	0.052
3.200	-0.	-0.	0.	0.136	-0.219	0.550	0.013	-1.210	1.070	-0.005	-0.048
3.400	-0.	-0.	0.	0.103	-0.176	0.600	0.007	-1.067	0.948	0.123	-0.146
3.600	-0.	-0.	0.	0.077	-0.141	0.650	0.004	-0.927	0.831	0.246	-0.242
3.800	-0.	-0.	0.	0.057	-0.112	0.700	0.002	-0.797	0.722	0.362	-0.332
4.000	-0.	-0.	0.	0.043	-0.088	0.750	0.001	-0.679	0.624	0.469	-0.416
4.200	-0.	-0.	0.	0.031	-0.070	0.800	0.001	-0.574	0.536	0.564	-0.493
4.400	-0.	-0.	0.	0.023	-0.055	0.850	0.001	-0.482	0.458	0.647	-0.581
4.600	-0.	-0.	0.	0.017	-0.043	0.900	0.	-0.402	0.389	0.718	-0.622
4.800	-0.	-0.	0.	0.012	-0.033	0.950	0.	-0.334	0.330	0.777	-0.675
5.000	-0.	-0.	0.	0.009	-0.026	1.000	0.	-0.277	0.279	0.825	-0.720
5.200	-0.	-0.	0.	0.007	-0.020	1.100	0.	-0.188	0.197	0.890	-0.787
5.400	-0.	-0.	0.	0.005	-0.015	1.200	0.	-0.126	0.139	0.919	-0.829
5.600	-0.	-0.	0.	0.003	-0.012	1.300	0.	-0.084	0.097	0.920	-0.848
5.800	-0.	-0.	0.	0.002	-0.009	1.400	-0.	-0.056	0.067	0.899	-0.849
6.000	-0.	-0.	0.	0.002	-0.007	1.500	-0.	-0.037	0.047	0.863	-0.835
6.200	-0.	-0.	0.	0.001	-0.005	1.600	-0.	-0.024	0.032	0.815	-0.810
6.400	-0.	-0.	0.	0.001	-0.004	1.700	-0.	-0.016	0.022	0.762	-0.777
6.600	-0.	-0.	0.	0.001	-0.003	1.800	-0.	-0.011	0.016	0.704	-0.739
6.800	-0.	-0.	0.	0.	-0.002	1.900	-0.	-0.007	0.011	0.646	-0.690
7.000	-0.	-0.	0.	0.	-0.002	2.000	-0.	-0.005	0.008	0.588	-0.652
7.200	-0.	-0.	0.	0.	-0.002	2.100	-0.	-0.003	0.005	0.532	-0.606
7.400	-0.	-0.	0.	0.	-0.001	2.200	-0.	-0.002	0.004	0.478	-0.561
7.600	-0.	-0.	0.	0.	-0.001	2.300	-0.	-0.002	0.003	0.428	-0.517
7.800	-0.	-0.	0.	0.	-0.001	2.400	-0.	-0.001	0.002	0.382	-0.474
						2.500	-0.	-0.001	0.001	0.339	-0.433
						2.600	-0.	-0.001	0.001	0.300	-0.395
						2.700	-0.	-0.	0.001	0.265	-0.358
						2.800	-0.	-0.	0.001	0.233	-0.324
						2.900	-0.	-0.	0.	0.204	-0.293
						3.000	-0.	-0.	0.	0.179	-0.264
						3.200	-0.	-0.	0.	0.136	-0.213
						3.400	-0.	-0.	0.	0.103	-0.170
						3.600	-0.	-0.	0.	0.077	-0.135
						3.800	-0.	-0.	0.	0.057	-0.107
						4.000	-0.	-0.	0.	0.043	-0.084
						4.200	-0.	-0.	0.	0.031	-0.066
						4.400	-0.	-0.	0.	0.023	-0.051
						4.600	-0.	-0.	0.	0.017	-0.040
						4.800	-0.	-0.	0.	0.012	-0.031
						5.000	-0.	-0.	0.	0.009	-0.024
						5.200	-0.	-0.	0.	0.007	-0.018
						5.400	-0.	-0.	0.	0.005	-0.014
						5.600	-0.	-0.	0.	0.003	-0.011
						5.800	-0.	-0.	0.	0.002	-0.008
						6.000	-0.	-0.	0.	0.002	-0.006
						6.200	-0.	-0.	0.	0.001	-0.005
						6.400	-0.	-0.	0.	0.001	-0.004
						6.600	-0.	-0.	0.	0.001	-0.003
						6.800	-0.	-0.	0.	0.	-0.002
						7.000	-0.	-0.	0.	0.	-0.002
						7.200	-0.	-0.	0.	0.	-0.001
						7.400	-0.	-0.	0.	0.	-0.001
						7.600	-0.	-0.	0.	0.	-0.001
						7.800	-0.	-0.	0.	0.	-0.001
$\lambda$	212.	23.3	18.2	3.85	2.70						
$\langle r^{-3} \rangle$	547.	44.8	14.3	5.01	1.49						
$\langle r^{-1} \rangle$	16.6	3.32	3.20	0.933	0.822						
$\langle r \rangle$	0.091	0.441	0.405	1.46	1.62						
$\langle r^2 \rangle$	0.011	0.230	0.203	2.43	3.06						
<b>Cl<sup>++</sup> D</b>											
r	1s	2s	2p	3s	3p						
0.001	0.134	0.038	0.	0.012	0.						
0.002	0.264	0.074	0.001	0.024	0.						
0.004	0.510	0.143	0.002	0.046	0.001						
0.006	0.740	0.207	0.005	0.067	0.002						
0.008	0.953	0.267	0.009	0.087	0.003						
0.010	1.152	0.322	0.014	0.104	0.004						
0.015	1.588	0.442	0.031	0.143	0.009						
0.020	1.945	0.539	0.052	0.174	0.016						
0.025	2.235	0.614	0.078	0.198	0.024						
0.030	2.465	0.669	0.108	0.216	0.033						
0.035	2.644	0.708	0.141	0.229	0.043						
0.040	2.778	0.732	0.177	0.236	0.054						
0.050	2.937	0.741	0.255	0.238	0.078						
0.060	2.982	0.708	0.339	0.225	0.103						

r	1s	2s	2p	3s	3p
$\lambda$	212.	23.3	18.2	3.84	2.79
$\langle r^{-2} \rangle$	547.	44.8	14.3	5.01	1.50
$\langle r^{-1} \rangle$	16.6	3.32	3.20	0.932	0.826
$\langle r \rangle$	0.091	0.441	0.405	1.46	1.61
$\langle r^2 \rangle$	0.011	0.230	0.203	2.44	3.02

### Ar <sup>1</sup>S

r	1s	2s	2p	3s	3p
0.001	0.146	0.042	0.	0.013	0.
0.002	0.287	0.082	0.001	0.025	0.
0.004	0.554	0.157	0.003	0.049	0.001
0.006	0.802	0.227	0.006	0.071	0.002
0.008	1.032	0.292	0.011	0.091	0.003
0.010	1.244	0.352	0.017	0.110	0.005
0.015	1.706	0.480	0.036	0.150	0.010
0.020	2.080	0.581	0.061	0.181	0.017
0.025	2.378	0.658	0.091	0.205	0.025
0.030	2.610	0.714	0.126	0.222	0.035
0.035	2.785	0.750	0.164	0.233	0.046
0.040	2.912	0.769	0.205	0.239	0.057
0.050	3.048	0.765	0.295	0.236	0.082
0.060	3.065	0.715	0.390	0.219	0.108
0.070	2.998	0.631	0.488	0.191	0.135
0.080	2.873	0.521	0.588	0.155	0.162
0.090	2.713	0.394	0.685	0.113	0.188
0.100	2.530	0.250	0.780	0.068	0.214
0.120	2.142	-0.036	0.958	-0.027	0.260
0.140	1.766	-0.327	1.115	-0.119	0.298
0.160	1.429	-0.599	1.248	-0.204	0.329
0.180	1.140	-0.841	1.357	-0.278	0.351
0.200	0.899	-1.050	1.442	-0.338	0.365
0.220	0.704	-1.223	1.504	-0.384	0.370
0.240	0.547	-1.362	1.547	-0.417	0.369
0.260	0.423	-1.469	1.571	-0.436	0.361
0.280	0.326	-1.546	1.580	-0.443	0.346
0.300	0.250	-1.597	1.575	-0.439	0.327
0.350	0.128	-1.631	1.516	-0.389	0.260
0.400	0.065	-1.568	1.411	-0.296	0.174
0.450	0.033	-1.448	1.281	-0.177	0.078
0.500	0.017	-1.298	1.141	-0.044	-0.023
0.550	0.009	-1.139	1.002	0.093	-0.125
0.600	0.005	-0.982	0.869	0.226	-0.222
0.650	0.003	-0.836	0.746	0.351	-0.315
0.700	0.002	-0.704	0.636	0.466	-0.400
0.750	0.001	-0.587	0.538	0.567	-0.477
0.800	0.001	-0.486	0.453	0.654	-0.545
0.850	0.	-0.400	0.379	0.728	-0.605
0.900	0.	-0.327	0.316	0.788	-0.657
0.950	0.	-0.267	0.263	0.836	-0.700
1.000	0.	-0.217	0.218	0.872	-0.735
1.100	-0.	-0.142	0.148	0.915	-0.786
1.200	-0.	-0.092	0.100	0.924	-0.813
1.300	-0.	-0.060	0.068	0.908	-0.821
1.400	-0.	-0.039	0.046	0.875	-0.814
1.500	-0.	-0.025	0.031	0.831	-0.796
1.600	-0.	-0.017	0.021	0.779	-0.770
1.700	-0.	-0.011	0.014	0.723	-0.739
1.800	-0.	-0.007	0.010	0.666	-0.704
1.900	-0.	-0.005	0.007	0.610	-0.667
2.000	-0.	-0.004	0.004	0.555	-0.629
2.100	-0.	-0.003	0.003	0.503	-0.591
2.200	-0.	-0.002	0.002	0.454	-0.553
2.300	-0.	-0.001	0.002	0.409	-0.516

r	1s	2s	2p	3s	3p
2.400	-0.	-0.001	0.001	0.367	-0.481
2.500	-0.	-0.001	0.001	0.328	-0.447
2.600	-0.	-0.001	0.001	0.293	-0.414
2.700	-0.	-0.001	0.	0.261	-0.383
2.800	-0.	-0.	0.	0.232	-0.355
2.900	-0.	-0.	0.	0.207	-0.327
3.000	-0.	-0.	0.	0.183	-0.302

3.200	-0.	-0.	0.	0.144	-0.256
3.400	-0.	-0.	0.	0.112	-0.216
3.600	-0.	-0.	0.	0.087	-0.182
3.800	-0.	-0.	0.	0.068	-0.153
4.000	-0.	-0.	0.	0.053	-0.128
4.200	-0.	-0.	0.	0.041	-0.107
4.400	-0.	-0.	0.	0.031	-0.090
4.600	-0.	-0.	0.	0.024	-0.075
4.800	-0.	-0.	0.	0.019	-0.062
5.000	-0.	-0.	0.	0.014	-0.052
5.200	-0.	-0.	0.	0.011	-0.043
5.400	-0.	-0.	0.	0.008	-0.036
5.600	-0.	-0.	0.	0.006	-0.029
5.800	-0.	-0.	0.	0.005	-0.024
6.000	-0.	-0.	0.	0.004	-0.020
6.200	-0.	-0.	0.	0.003	-0.017
6.400	-0.	-0.	0.	0.002	-0.014
6.600	-0.	-0.	0.	0.002	-0.011
6.800	-0.	-0.	0.	0.001	-0.009
7.000	-0.	-0.	0.	0.001	-0.008
7.200	-0.	-0.	0.	0.001	-0.006
7.400	-0.	-0.	0.	0.001	-0.005
7.600	-0.	-0.	0.	0.	-0.004
7.800	-0.	-0.	0.	0.	-0.004
8.000	-0.	-0.	0.	0.	-0.003
8.200	-0.	-0.	0.	0.	-0.002
8.400	-0.	-0.	0.	0.	-0.002
8.600	-0.	-0.	0.	0.	-0.002
8.800	-0.	-0.	0.	0.	-0.001
9.000	-0.	-0.	0.	0.	-0.001
9.500	-0.	-0.	0.	0.	-0.001

r	1s	2s	2p	3s	3p
$\lambda$	237.	24.6	19.1	2.55	1.18
$\langle r^{-2} \rangle$	614.	51.4	16.5	5.36	1.47
$\langle r^{-1} \rangle$	17.6	3.56	3.45	0.962	0.814
$\langle r \rangle$	0.086	0.412	0.375	1.42	1.66
$\langle r^2 \rangle$	0.010	0.201	0.174	2.35	3.31

### Ar<sup>+</sup> <sup>2</sup>P

r	1s	2s	2p	3s	3p
0.001	0.146	0.042	0.	0.013	0.
0.002	0.287	0.082	0.001	0.026	0.
0.004	0.554	0.157	0.003	0.051	0.001
0.006	0.802	0.228	0.006	0.073	0.002
0.008	1.032	0.292	0.011	0.094	0.003
0.010	1.244	0.352	0.017	0.113	0.005
0.015	1.706	0.481	0.036	0.154	0.011
0.020	2.080	0.582	0.061	0.187	0.018
0.025	2.378	0.659	0.091	0.211	0.027
0.030	2.610	0.714	0.126	0.229	0.037
0.035	2.785	0.750	0.164	0.240	0.049
0.040	2.912	0.769	0.205	0.246	0.061
0.050	3.048	0.765	0.295	0.243	0.087
0.060	3.065	0.715	0.390	0.225	0.115
0.070	2.998	0.631	0.489	0.196	0.144
0.080	2.873	0.522	0.588	0.159	0.172
0.090	2.713	0.395	0.685	0.116	0.200
0.100	2.530	0.256	0.780	0.070	0.227

r	1s	2s	2p	3s	3p
0.120	2.142	-0.036	0.958	-0.028	0.276
0.140	1.766	-0.327	1.115	-0.123	0.317
0.160	1.429	-0.599	1.248	-0.211	0.350
0.180	1.140	-0.841	1.357	-0.286	0.373
0.200	0.899	-1.050	1.442	-0.348	0.387
0.220	0.704	-1.224	1.505	-0.396	0.393
0.240	0.547	-1.363	1.547	-0.429	0.392
0.260	0.423	-1.470	1.572	-0.449	0.383
0.280	0.326	-1.547	1.580	-0.456	0.367
0.300	0.250	-1.598	1.575	-0.452	0.347
0.350	0.128	-1.631	1.516	-0.400	0.275
0.400	0.065	-1.568	1.411	-0.303	0.183
0.450	0.033	-1.448	1.281	-0.180	0.080
0.500	0.017	-1.298	1.141	-0.043	-0.028
0.550	0.009	-1.139	1.002	0.098	-0.136
0.600	0.005	-0.982	0.869	0.236	-0.240
0.650	0.003	-0.835	0.746	0.365	-0.338
0.700	0.002	-0.703	0.636	0.482	-0.428
0.750	0.001	-0.586	0.538	0.586	-0.510
0.800	0.001	-0.485	0.453	0.675	-0.582
0.850	0.	-0.399	0.379	0.750	-0.644
0.900	0.	-0.327	0.316	0.812	-0.698
0.950	0.	-0.266	0.262	0.860	-0.742
1.000	0.	-0.216	0.217	0.895	-0.778
1.100	0.	-0.141	0.148	0.936	-0.828
1.200	-0.	-0.092	0.100	0.941	-0.852
1.300	-0.	-0.059	0.068	0.922	-0.855
1.400	-0.	-0.038	0.045	0.884	-0.842
1.500	-0.	-0.025	0.031	0.834	-0.818
1.600	-0.	-0.016	0.021	0.777	-0.785
1.700	-0.	-0.011	0.014	0.716	-0.747
1.800	-0.	-0.007	0.009	0.655	-0.704
1.900	-0.	-0.005	0.006	0.595	-0.660
2.000	-0.	-0.003	0.004	0.536	-0.615
2.100	-0.	-0.002	0.003	0.482	-0.571
2.200	-0.	-0.002	0.002	0.430	-0.528
2.300	-0.	-0.001	0.001	0.383	-0.486
2.400	-0.	-0.001	0.001	0.340	-0.446
2.500	-0.	-0.001	0.001	0.301	-0.408
2.600	-0.	-0.001	0.001	0.265	-0.372
2.700	-0.	0.	0.	0.233	-0.339
2.800	-0.	0.	0.	0.205	-0.308
2.900	-0.	0.	0.	0.179	-0.280
3.000	-0.	0.	0.	0.157	-0.253
3.200	-0.	0.	0.	0.119	-0.207
3.400	-0.	0.	0.	0.090	-0.168
3.600	-0.	0.	0.	0.068	-0.136
3.800	-0.	0.	0.	0.051	-0.109
4.000	-0.	0.	0.	0.038	-0.087
4.200	-0.	0.	0.	0.028	-0.070
4.400	-0.	0.	0.	0.021	-0.056
4.600	-0.	0.	0.	0.016	-0.044
4.800	-0.	0.	0.	0.011	-0.035
5.000	-0.	0.	0.	0.008	-0.028
5.200	-0.	0.	0.	0.006	-0.022
5.400	-0.	0.	0.	0.005	-0.017
5.600	-0.	0.	0.	0.003	-0.013
5.800	-0.	0.	0.	0.002	-0.011
6.000	-0.	0.	0.	0.002	-0.008
6.200	-0.	0.	0.	0.001	-0.006
6.400	-0.	0.	0.	0.001	-0.005
6.600	-0.	0.	0.	0.001	-0.004
6.800	-0.	0.	0.	0.001	-0.003
7.000	-0.	0.	0.	0.	-0.002
7.200	-0.	0.	0.	0.	-0.002
7.400	-0.	0.	0.	0.	-0.001
7.600	-0.	0.	0.	0.	-0.001
7.800	-0.	0.	0.	0.	-0.001
8.000	-0.	0.	0.	0.	-0.001
8.200	-0.	0.	0.	0.	-0.001

r	1s	2s	2p	3s	3p
λ	238.	25.7	20.2	3.42	2.09
$\langle r^{-2} \rangle$	614.	51.4	16.5	5.66	1.64
$\langle r^{-1} \rangle$	17.6	3.56	3.45	0.989	0.861
$\langle r \rangle$	0.086	0.412	0.375	1.38	1.56
$\langle r^2 \rangle$	0.010	0.201	0.174	2.20	2.86

### Ar<sup>++</sup> 1S

r	1s	2s	2p	3s	3p
0.001	0.146	0.042	0.	0.014	0.
0.002	0.287	0.082	0.001	0.027	0.
0.004	0.554	0.157	0.003	0.052	0.001
0.006	0.802	0.228	0.006	0.076	0.002
0.008	1.032	0.293	0.011	0.097	0.003
0.010	1.244	0.352	0.017	0.117	0.005
0.015	1.706	0.481	0.036	0.160	0.011
0.020	2.080	0.582	0.061	0.193	0.019
0.025	2.378	0.659	0.091	0.219	0.029
0.030	2.610	0.714	0.126	0.237	0.039
0.035	2.785	0.751	0.164	0.248	0.051
0.040	2.912	0.770	0.206	0.254	0.064
0.050	3.049	0.766	0.295	0.251	0.092
0.060	3.065	0.716	0.390	0.233	0.121
0.070	2.998	0.631	0.489	0.203	0.151
0.080	2.874	0.522	0.588	0.165	0.182
0.090	2.713	0.395	0.686	0.120	0.211
0.100	2.530	0.256	0.781	0.072	0.239
0.120	2.142	-0.036	0.959	-0.029	0.291
0.140	1.766	-0.328	1.115	-0.128	0.334
0.160	1.429	-0.600	1.249	-0.218	0.368
0.180	1.140	-0.842	1.357	-0.296	0.392
0.200	0.899	-1.051	1.442	-0.360	0.407
0.220	0.704	-1.225	1.505	-0.409	0.413
0.240	0.547	-1.364	1.548	-0.444	0.411
0.260	0.423	-1.471	1.572	-0.464	0.401
0.280	0.326	-1.548	1.581	-0.471	0.385
0.300	0.250	-1.599	1.576	-0.466	0.363
0.350	0.128	-1.632	1.516	-0.411	0.286
0.400	0.065	-1.569	1.411	-0.311	0.188
0.450	0.033	-1.448	1.281	-0.183	0.079
0.500	0.017	-1.298	1.141	-0.040	-0.036
0.550	0.009	-1.138	1.001	0.106	-0.150
0.600	0.005	-0.981	0.868	0.249	-0.260
0.650	0.003	-0.834	0.746	0.382	-0.363
0.700	0.002	-0.702	0.635	0.503	-0.457
0.750	0.001	-0.585	0.537	0.609	-0.542
0.800	0.001	-0.484	0.452	0.701	-0.616
0.850	0.	-0.398	0.378	0.777	-0.680
0.900	0.	-0.325	0.315	0.839	-0.734
0.950	0.	-0.265	0.262	0.886	-0.779
1.000	0.	-0.215	0.217	0.921	-0.814
1.100	0.	-0.140	0.148	0.958	-0.861
1.200	-0.	-0.091	0.100	0.959	-0.880
1.300	-0.	-0.058	0.067	0.934	-0.878
1.400	-0.	-0.038	0.045	0.890	-0.859
1.500	-0.	-0.024	0.030	0.834	-0.828
1.600	-0.	-0.016	0.020	0.770	-0.788
1.700	-0.	-0.010	0.014	0.704	-0.743
1.800	-0.	-0.007	0.009	0.638	-0.695
1.900	-0.	-0.004	0.006	0.574	-0.645
2.000	-0.	-0.003	0.004	0.512	-0.595
2.100	-0.	-0.002	0.003	0.455	-0.547
2.200	-0.	-0.001	0.002	0.402	-0.499
2.300	-0.	-0.001	0.001	0.353	-0.455



r	1s	2s	2p	3s	3p	r	1s	2s	2p	3s	3p
2.400	-0.	-0.001	0.001	0.309	-0.412	0.280	0.326	-1.548	1.581	-0.470	0.389
2.500	-0.	-0.001	0.001	0.270	-0.373	0.300	0.250	-1.599	1.576	-0.466	0.366
2.600	-0.	-0.	0.001	0.235	-0.336	0.350	0.128	-1.632	1.516	-0.411	0.290
2.700	-0.	-0.	0.	0.204	-0.302	0.400	0.065	-1.569	1.411	-0.311	0.191
2.800	-0.	-0.	0.	0.176	-0.270	0.450	0.033	-1.448	1.281	-0.183	0.081
2.900	-0.	-0.	0.	0.152	-0.242	0.500	0.017	-1.298	1.141	-0.040	-0.034
3.000	-0.	-0.	0.	0.131	-0.216	0.550	0.009	-1.138	1.002	0.106	-0.149
						0.600	0.005	-0.981	0.869	0.248	-0.259
3.200	-0.	-0.	0.	0.097	-0.171	0.650	0.003	-0.835	0.746	0.381	-0.363
3.400	-0.	-0.	0.	0.071	-0.134	0.700	0.002	-0.702	0.635	0.502	-0.459
3.600	-0.	-0.	0.	0.051	-0.105	0.750	0.001	-0.585	0.537	0.608	-0.544
3.800	-0.	-0.	0.	0.037	-0.082	0.800	0.001	-0.484	0.452	0.699	-0.620
4.000	-0.	-0.	0.	0.027	-0.063	0.850	0.	-0.398	0.378	0.776	-0.685
4.200	-0.	-0.	0.	0.019	-0.049	0.900	0.	-0.326	0.315	0.837	-0.740
4.400	-0.	-0.	0.	0.014	-0.037	0.950	0.	-0.265	0.262	0.885	-0.785
4.600	-0.	-0.	0.	0.010	-0.029	1.000	0.	-0.215	0.217	0.920	-0.821
4.800	-0.	-0.	0.	0.007	-0.022						
5.000	-0.	-0.	0.	0.005	-0.017	1.100	0.	-0.140	0.148	0.958	-0.869
5.200	-0.	-0.	0.	0.003	-0.013	1.200	-0.	-0.091	0.100	0.959	-0.888
5.400	-0.	-0.	0.	0.002	-0.009	1.300	-0.	-0.059	0.067	0.934	-0.885
5.600	-0.	-0.	0.	0.002	-0.007	1.400	-0.	-0.038	0.045	0.890	-0.865
5.800	-0.	-0.	0.	0.001	-0.005	1.500	-0.	-0.024	0.030	0.834	-0.833
6.000	-0.	-0.	0.	0.001	-0.004	1.600	-0.	-0.016	0.020	0.771	-0.791
6.200	-0.	-0.	0.	0.001	-0.003	1.700	-0.	-0.010	0.014	0.705	-0.744
6.400	-0.	-0.	0.	0.	-0.002	1.800	-0.	-0.007	0.009	0.639	-0.694
6.600	-0.	-0.	0.	0.	-0.002	1.900	-0.	-0.004	0.006	0.575	-0.642
6.800	-0.	-0.	0.	0.	-0.001	2.000	-0.	-0.003	0.004	0.513	-0.591
7.000	-0.	-0.	0.	0.	-0.001	2.100	-0.	-0.002	0.003	0.456	-0.540
7.200	-0.	-0.	0.	0.	-0.001	2.200	-0.	-0.001	0.002	0.403	-0.492
						2.300	-0.	-0.001	0.001	0.354	-0.446
$\lambda$	240.	26.9	21.4	4.40	2.96	2.400	-0.	-0.001	0.001	0.310	-0.403
$\langle r^{-2} \rangle$	614.	51.5	16.5	6.03	1.78	2.500	-0.	-0.001	0.001	0.271	-0.362
$\langle r^{-1} \rangle$	17.6	3.56	3.45	1.02	0.900	2.600	-0.	-0.	0.	0.236	-0.325
$\langle r \rangle$	0.086	0.412	0.375	1.34	1.49	2.700	-0.	-0.	0.	0.205	-0.291
$\langle r^2 \rangle$	0.010	0.201	0.174	2.06	2.59	2.800	-0.	-0.	0.	0.177	-0.259
						2.900	-0.	-0.	0.	0.153	-0.231
						3.000	-0.	-0.	0.	0.132	-0.205

**Ar<sup>++</sup> 3P**

r	1s	2s	2p	3s	3p	r	1s	2s	2p	3s	3p
0.001	0.146	0.042	0.	0.014	0.	3.200	-0.	-0.	0.	0.097	-0.161
0.002	0.287	0.082	0.001	0.027	0.	3.400	-0.	-0.	0.	0.071	-0.125
						3.600	-0.	-0.	0.	0.052	-0.097
0.004	0.554	0.157	0.003	0.052	0.001	3.800	-0.	-0.	0.	0.037	-0.074
0.006	0.802	0.228	0.006	0.076	0.002	4.000	-0.	-0.	0.	0.027	-0.057
0.008	1.032	0.293	0.011	0.097	0.003	4.200	-0.	-0.	0.	0.019	-0.043
0.010	1.244	0.352	0.017	0.117	0.005	4.400	-0.	-0.	0.	0.014	-0.033
						4.600	-0.	-0.	0.	0.010	-0.025
0.015	1.706	0.481	0.036	0.159	0.011	4.800	-0.	-0.	0.	0.007	-0.019
0.020	2.080	0.582	0.061	0.193	0.019	5.000	-0.	-0.	0.	0.005	-0.014
0.025	2.378	0.659	0.091	0.218	0.029	5.200	-0.	-0.	0.	0.003	-0.011
0.030	2.610	0.714	0.126	0.236	0.040	5.400	-0.	-0.	0.	0.002	-0.008
0.035	2.785	0.751	0.164	0.248	0.052	5.600	-0.	-0.	0.	0.002	-0.006
0.040	2.912	0.770	0.205	0.254	0.065	5.800	-0.	-0.	0.	0.001	-0.004
						6.000	-0.	-0.	0.	0.001	-0.003
0.050	3.049	0.766	0.295	0.251	0.093	6.200	-0.	-0.	0.	0.001	-0.002
0.060	3.065	0.716	0.390	0.233	0.122	6.400	-0.	-0.	0.	0.	-0.002
0.070	2.998	0.631	0.489	0.203	0.153	6.600	-0.	-0.	0.	0.	-0.001
0.080	2.874	0.522	0.588	0.164	0.183	6.800	-0.	-0.	0.	0.	-0.001
0.090	2.713	0.395	0.686	0.120	0.213	7.000	-0.	-0.	0.	0.	-0.001
0.100	2.530	0.256	0.781	0.072	0.241	7.200	-0.	-0.	0.	0.	-0.001
0.120	2.142	-0.036	0.959	-0.029	0.293	$\lambda$	239.	26.9	21.3	4.38	3.13
0.140	1.766	-0.328	1.115	-0.127	0.337	$\langle r^{-2} \rangle$	614.	51.5	16.5	6.01	1.81
0.160	1.429	-0.599	1.248	-0.218	0.371	$\langle r^{-1} \rangle$	17.6	3.56	3.45	1.02	0.908
0.180	1.140	-0.842	1.357	-0.296	0.396	$\langle r \rangle$	0.086	0.412	0.375	1.34	1.47
0.200	0.899	-1.051	1.442	-0.360	0.411	$\langle r^2 \rangle$	0.010	0.201	0.174	2.07	2.53
0.220	0.704	-1.225	1.505	-0.409	0.417						
0.240	0.547	-1.364	1.548	-0.443	0.415						
0.260	0.423	-1.471	1.572	-0.463	0.405						

Ar<sup>++</sup> 1D

r	1s	2s	2p	3s	3p
0.001	0.146	0.042	0.	0.014	0.
0.002	0.287	0.082	0.001	0.027	0.
0.004	0.554	0.157	0.003	0.052	0.001
0.006	0.802	0.228	0.006	0.076	0.002
0.008	1.032	0.293	0.011	0.097	0.003
0.010	1.244	0.352	0.017	0.117	0.005
0.015	1.706	0.481	0.036	0.160	0.011
0.020	2.080	0.582	0.061	0.193	0.019
0.025	2.378	0.659	0.091	0.218	0.029
0.030	2.610	0.714	0.126	0.236	0.040
0.035	2.785	0.751	0.164	0.248	0.052
0.040	2.912	0.770	0.206	0.254	0.064
0.050	3.049	0.766	0.295	0.251	0.092
0.060	3.065	0.716	0.390	0.233	0.122
0.070	2.998	0.631	0.489	0.203	0.152
0.080	2.874	0.522	0.588	0.164	0.182
0.090	2.713	0.395	0.686	0.120	0.212
0.100	2.530	0.256	0.781	0.072	0.241
0.120	2.142	-0.036	0.959	-0.029	0.292
0.140	1.766	-0.328	1.115	-0.128	0.336
0.160	1.429	-0.599	1.249	-0.218	0.370
0.180	1.140	-0.842	1.357	-0.290	0.394
0.200	0.899	-1.051	1.442	-0.360	0.410
0.220	0.704	-1.225	1.505	-0.409	0.418
0.240	0.547	-1.364	1.548	-0.443	0.413
0.260	0.423	-1.471	1.572	-0.463	0.404
0.280	0.326	-1.548	1.581	-0.470	0.387
0.300	0.250	-1.599	1.576	-0.466	0.365
0.350	0.128	-1.632	1.516	-0.411	0.288
0.400	0.065	-1.569	1.411	-0.311	0.190
0.450	0.033	-1.448	1.281	-0.183	0.080
0.500	0.017	-1.298	1.141	-0.040	-0.035
0.550	0.009	-1.138	1.001	0.106	-0.149
0.600	0.005	-0.981	0.868	0.248	-0.260
0.650	0.003	-0.834	0.746	0.381	-0.363
0.700	0.002	-0.702	0.635	0.502	-0.458
0.750	0.001	-0.585	0.537	0.609	-0.543
0.800	0.001	-0.484	0.452	0.700	-0.618
0.850	0.	-0.398	0.378	0.776	-0.683
0.900	0.	-0.326	0.315	0.838	-0.738
0.950	0.	-0.265	0.262	0.886	-0.783
1.000	0.	-0.215	0.217	0.921	-0.818
1.100	0.	-0.140	0.148	0.958	-0.866
1.200	-0.	-0.091	0.100	0.959	-0.885
1.300	-0.	-0.059	0.067	0.934	-0.882
1.400	-0.	-0.038	0.045	0.890	-0.863
1.500	-0.	-0.024	0.030	0.834	-0.831
1.600	-0.	-0.016	0.020	0.771	-0.790
1.700	-0.	-0.010	0.014	0.705	-0.744
1.800	-0.	-0.007	0.009	0.639	-0.694
1.900	-0.	-0.004	0.006	0.574	-0.644
2.000	-0.	-0.003	0.004	0.513	-0.593
2.100	-0.	-0.002	0.003	0.455	-0.543
2.200	-0.	-0.001	0.002	0.402	-0.495
2.300	-0.	-0.001	0.001	0.354	-0.449
2.400	-0.	-0.001	0.001	0.310	-0.406
2.500	-0.	-0.001	0.001	0.271	-0.366
2.600	-0.	-0.	0.001	0.236	-0.329
2.700	-0.	-0.	0.	0.204	-0.295
2.800	-0.	-0.	0.	0.177	-0.264
2.900	-0.	-0.	0.	0.153	-0.235
3.000	-0.	-0.	0.	0.131	-0.209
3.200	-0.	-0.	0.	0.097	-0.165
3.400	-0.	-0.	0.	0.071	-0.129
3.600	-0.	-0.	0.	0.052	-0.100
3.800	-0.	-0.	0.	0.037	-0.077

r	1s	2s	2p	3s	3p
4.000	-0.	-0.	0.	0.027	-0.059
4.200	-0.	-0.	0.	0.019	-0.045
4.400	-0.	-0.	0.	0.014	-0.035
4.600	-0.	-0.	0.	0.010	-0.028
4.800	-0.	-0.	0.	0.007	-0.020
5.000	-0.	-0.	0.	0.005	-0.015
5.200	-0.	-0.	0.	0.003	-0.011
5.400	-0.	-0.	0.	0.002	-0.009
5.600	-0.	-0.	0.	0.002	-0.006
5.800	-0.	-0.	0.	0.001	-0.005
6.000	-0.	-0.	0.	0.001	-0.004
6.200	-0.	-0.	0.	0.001	-0.003
6.400	-0.	-0.	0.	0.	-0.002
6.600	-0.	-0.	0.	0.	-0.001
6.800	-0.	-0.	0.	0.	-0.001
7.000	-0.	-0.	0.	0.	-0.001
7.200	-0.	-0.	0.	0.	-0.001
λ	239.	26.9	21.4	4.39	3.07
⟨r <sup>-2</sup> ⟩	614.	51.5	16.5	6.02	1.80
⟨r <sup>-1</sup> ⟩	17.6	3.56	3.45	1.02	0.905
⟨r⟩	0.086	0.412	0.375	1.34	1.48
⟨r <sup>2</sup> ⟩	0.010	0.201	0.174	2.06	2.55