Preface

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Preface

This special issue contains papers presented at the International Conference on Strongly Coupled Coulomb Systems (SCCS) which was held during the week of 2–6 September 2002 in Santa Fe, New Mexico. It was the ninth in a series of conferences starting in 1977 in Orléans-la-Source, France as a summer institute. The second in the series was a workshop held in Les Houches in 1982. The conferences were then held in the following order: Santa Cruz, California in 1986, Tokyo, Japan in 1989, Rochester, USA in 1992, Binz, Germany in 1995, Boston, USA in 1997 and St Malo, France in 1999. The planned frequency for the future is every three years. The purpose of these conferences is to provide an international forum for the presentation and discussion of research accomplishments and ideas relating to plasma, liquid and condensed matter systems dominated by strong Coulomb interactions between their constituents.

Strongly coupled Coulomb systems encompass diverse many-body systems and physical conditions. Each meeting has seen an evolution of topics and emphasis as new discoveries and new methods appear. This year, sessions were organized for invited presentations and posters on dense plasmas, colloids, condensed matter, two-dimensional systems, astrophysics, dense hydrogen, ultra-cold plasmas, traps and beams, dusty plasmas, clusters, kinetic theory and statistical mechanics. Within each area new results from theory, simulation and experiment were presented. In addition, a special panel discussion was held one evening to explore the questions which continue to be posed by the experiments on and modelling of dense hydrogen. As this special issue illustrates, the field remains vibrant and challenging, being driven to a great extent by new experimental tools and access to new strongly coupled conditions. This is illustrated by the inclusion of developments in the area of beams, traps, plasma crystals and ultra-cold plasmas.

In total, 105 participants from 13 countries attended the conference, including 34 invited speakers. Unfortunately, some international speakers could not attend due to problems with obtaining visas, and we deeply regret the difficulties and lost opportunities. These individuals and all others giving presentations at the conference, including invited plenary and topical talks and posters, were asked to contribute to this special issue and most have done so. We trust that this special issue will accurately record the contents of the conference, and provide a valuable resource for researchers in this rapidly evolving field.

We would like to thank all members of the International Advisory Board for their contributions to the conference. In particular, we thank Chairman Jean-Pierre Hansen for his diligent work at coordinating the International Advisory Board, the Programme Committee and the Local Organizing Committee. Of course, nothing would have been possible without the dedicated efforts of the Local Organizing Committee. We wish to thank the Los Alamos National Laboratory (Theoretical, Physics, Applied Physics, Materials Science and Technology divisions) and Sandia National Laboratory (Pulsed Power Sciences) for sponsoring this conference. We also gratefully acknowledge the administrative support we received from Marianna Martinez, Marion Hutton and Ellie Vigil of Los Alamos National Laboratory, all of whom were major contributors to the success of the conference.

John F Benage, James W Dufty and Michael S Murillo
Guest Editors

List of participants

1 G Sarkisov
2 M Martinez
3 H Reinholz
4 M Knudson
5 N Tahir
6 D Saumon
7 J Clerouin
8 M S Murillo
9 M Desjarlais
10 M Fisher
11 S Kuhlbrodt
12 R Redmer
13 D O Gericke
14 M Sears
15 G Ropke
16 G Kalman
17 D Pines
18 F Wysocki
19 T Tierney
20 J F Benage
21 T Bornath
22 W-D Kraeft
23 I Valuev
24 H Lowen
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26 K Golden
27 G Norman
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58 M Rosenberg
59 Y Levin
60 I Morozov
61 G Lapenta
62 J Kress
63 F Leys
64 S Rosenthal
65 S Mazevet
66 G Hazak
67 V Recoules
68 A DeSilva
69 K Qiao
70 G Faussurier
71 J Reay
72 J Simcik

Participants of the International Conference on Strongly Coupled Coulomb Systems (SCCS)

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Obituary

Forty years of plasma line broadening—in memory of Professor Charles Hooper Jr

Professor Charles Hooper (3 June 1932–5 May 2000)

Our friend and colleague, Charles Hooper Jr, died on 5 May 2002 after a long illness and a valiant battle against it. This presentation is a brief look back at the issues in plasma line broadening over the past forty years, and the contributions to them by Chuck and his students.

Chuck graduated from Dartmouth College in 1954. He served in the US Navy for two years before receiving a PhD from Johns Hopkins University in 1963. He then joined the faculty at the University of Florida where his first two papers were written on 'Electric microfield distributions in plasmas' and 'Relaxation theory of spectral line broadening in plasma'. These two topics were the focus of his research for the next four decades. A personal perspective on the primary problems in this field for each decade is presented here to highlight the many contributions from his research programme. Chuck was particularly proud of the seventeen PhD students who graduated during this time, most of whom are still active in line broadening and related areas.

During the early 1970s he recognized the importance of laser fusion and was a strong protagonist for US investment in this area at the national laboratories. He became a leader in this field through his continuing work on spectroscopy as the primary diagnostic tool for laser-produced plasmas. As such Chuck served on several advisory panels at Lawrence Livermore National Laboratory and Los Alamos National Laboratory. He was also co-organizer of a series of conferences on radiative and atomic processes in dense plasmas for the past twenty years. His most recent research has been in collaboration with the University of Rochester Laser Laboratory where he designed and analysed experiments on laser-produced plasmas. The Department of Energy has continuously supported his research since 1974.

Less well-known to the plasma community are Chuck's successes as Chairman of the Physics Department at the University of Florida from 1979–86. He initiated a new phase of growth in many science departments at both the University of Florida and Florida State University through his statewide cross-disciplinary Microfabritec programme, bringing significant new funds and faculty lines to physics and materials sciences. He was recognized with The Distinguished Service Award from the National High Magnetic Field Laboratory in 2000 as founder and former director of that programme.

The field of plasma line broadening has lost one of its most dedicated and enthusiastic spokesmen. His colleagues will miss a cheerful and personable friend, and will remember well his irrefutable response to disagreement, 'I am not convinced. . . '.

James W Dufty
Department of Physics, University of Florida, Gainesville, FL 32611

Obituary

In Memorium: Dr Yaakov (Yasha) Rosenfeld

Dr Yaakov Rosenfeld (16 February 1948–21 July 2002)

In his research life, all too brief, Yasha Rosenfeld notably enriched and significantly advanced an area of physics which is still one of the more challenging fields in the expanding pantheon of the condensed matter sciences: the statistical physics of the liquid state. The ambit of physics associated with this highly correlated state of matter is itself extraordinarily broad, and Yasha's work has had notable impact over an impressively wide front, including charged and neutral liquids, uniform and non-uniform liquids, classical and quantal liquids, single component and multicomponent liquids, liquids close to and far from criticality, liquids both disturbed and in equilibrium. He also greatly elucidated the universal and scaling properties of liquids, and many at this conference will have encountered and admired his remarkable fundamental measures functional, originating in the latter stages of his life.

Yasha was an undergraduate at the Technion, and a graduate student (for both masters and doctoral degrees) at the Weizmann Institute. He was a Weizmann Fellow at Cornell University in 1977–78, and it was both a great pleasure and a considerable stimulation to work with him during this period. Subsequently he held several visiting appointments at distinguished intitutions in the US and in Europe, while holding (since 1973) a permanent position at the Nuclear Research Center of the Negev. His first two papers (in 1974 and 75, and joint with Thieberger) dealt with the square well fluid and solid; at the end of his life he had again taken up the pressure dissociation of dense hydrogen a topic he also worked on in 1976. In the intervening years there are more than 100 papers prolifically covering all the areas mentioned above.

Because of his originality and eclectic interests, and particularly his ability to link to so many areas in the physics of liquids, he was always much in demand as a speaker at conferences (such as ours). We can but speculate on what more he might have contributed, for he was surely

one of the most productive of physicists in our field and also surely in full flight with respect to his creative powers. Yasha's passing has therefore robbed us of one who has given '...a purpose in liquidity...' and for many of us we have also lost a deeply admired friend and colleague, one who was unfailingly generous with insights and ideas, and one whose cheerful scepticism was invariably a constant creative and innovative force on the road to the deeper understanding of the liquid state.

Neil Ashcroft