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Preface. Quantum Gravity in the Southern Cone

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The second edition of the Quantum Gravity in the Southern Cone conference was held at the Centro Atómico Bariloche, Argentina, on January 7–10, 1998. The conference brought together 40 researchers, both resident and nonresident Argentinian, Chilean, and Uruguayan physicists as well as experts from the northern hemisphere, working on different aspects of quantum gravity, string theory, and related topics. The plenary lectures enabled the participants to obtain a global picture of the status of the field in the various approaches. The conference was further enriched by poster sessions.

The following list summarizes the topics covered by the lecturers and the contents of this volume.

CANONICAL QUANTUM GRAVITY

Jorge Pullin overviewed the attempts to apply the rules of canonical quantization to general relativity. He stressed the important role played by spin networks and by Thiemann's Hamiltonian. The problems presented by this Hamiltonian (it commutes on non-diffeomorphism-invariant states) were addressed by **Rodolfo Gambini**, who reported on progress made to solve them.

Midisuperspace models of canonical quantum gravity were considered by **Charles Torre**, who indicated that one can satisfactorily quantize quantum parametrized field theories on a two-dimensional spacetime, but that the quantization of such theories in higher dimensions is an open problem.

A framework for modeling quantum gravitational collapse was discussed by **Karel Kuchar**, who considered the canonical dynamics of matter shells. Both the dynamics of the shell and that of the surrounding spacetime were shown to follow from a single variational principle.

By formulating general relativity as a theory of surfaces, **Carlos Kozameh** showed how to construct a quantum spacetime using only Scri equipped with free functions as the kinematical structure.

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STRING THEORY AND HIGHER DIMENSIONAL OBJECTS

Juan Maldacena discussed the large-N limit of certain field theories and its relation to gravity. In a similar context, **Adam Schwimmer** referred to $N = 1$ (Seiberg) duality in field theory and its realization through branes.

Phenomenological aspects of string theory were covered by **Gerardo Aldazabal**, who discussed nonperturbative orbifold vacua.

Higher dimensional objects were considered by several speakers in different approaches. Branes in supergravities, string theory, and M theory were discussed by **Martin Cederwall**. **Marc Henneaux** referred to dyons, charge quantization, and electric–magnetic duality for p-form theories in $2(p + 1)$ spacetime dimensions with arbitrary gauge-invariant self-interactions. **Brandon Carter** discussed the geometry of nonnull p surfaces embedded in n dimensions. Electric 2-branes were presented by **Rodrigo Aros**.

SUPERGRAVITY

Jorge Zanelli reviewed Chern–Simons supergravity in $(2n - 1)$ dimensions, showing that they contain nontrivial dynamics leading to interesting classical solutions such as black holes, solitons, membranes, etc.

BLACK HOLE PHYSICS AND SEMICLASSICAL THEORIES

Several speakers referred to the physics of black holes.

In the context of a two-dimensional, exactly solvable model, **J. Russo** outlined the construction of an S-matrix and showed that black holes will radiate out an energy of Planck order, stabilizing after a transitory period. A similar picture appears in $3 + 1$ Einstein gravity with spherical symmetry. **Raphael Bousso** discussed the evaporation of Schwarzschild–de Sitter black holes including the one-loop effective action.

Bei-Lok Hu addressed the problem of fluctuations and backreaction in semiclassical cosmology and black holes by presenting a history of the subject and conjectured that a stochastic description in terms of the Einstein–Langevin equation becomes relevant at the Planck scale. Semiclassical theories were also considered by **Carmen Molina-Paris** and by **Stephen Ramsey**.

THE EARLY UNIVERSE

Hector Rubinstein reviewed the status of the big bang standard model and the latest data available from observations.

Posters were exhibited by M. Castagnino, D. Dalvit, R. Deza, S. Landau, F. Lombardo, D. Mazzitelli, O. Moreschi, C. Núñez, P. Sisterna, and M.

Socolovsky. Some of these contributions are included at the end of this volume.

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We would like to thank Gerardo Aldazabal and Rafael Ferraro, who helped us with the organization of the conference.

Finally, we wish to express our gratitude to our visiting lecturers and participants for the warm and cordial atmosphere we all enjoyed during the meeting, as well as for being available for questions and discussions.