Microphysics in Computational Relativistic Astrophysics - MICRA2009, Niels Bohr International Academy, Copenhagen, 24–28 August 2009

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EDITORIAL

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This special section is devoted to the workshop 'Microphysics in Computational Relativistic Astrophysics - MICRA2009', which took place at the Niels Bohr International Academy, in Copenhagen, 24–28 August 2009.

One of the most important challenges in contemporary relativistic astrophysics is to understand the formation and physical properties of compact stars and black holes and the dynamics and central engines of cosmic explosions. A wealth of observational data is becoming available in many different bands of the electromagnetic spectrum, ranging from radio waves to gamma rays. This, together with the prospect of the direct detection of gravitational waves and neutrinos, has spurred theoretical efforts to understand the processes of stellar collapse and the merging of binary compact stars. The increasing variety and accuracy of the data call for more realistic theoretical modelling.

During the past quarter of a century enormous strides have been made in developing numerical methods for treating hydrodynamics, radiation transport, and general relativity, and the computing resources available have multiplied manyfold. To construct more realistic numerical models, one of the greatest needs is for improved input on microphysical properties, especially the equation of state of dense matter and the rates of neutrino production, scattering and absorption processes. Related to this is the problem of preparing the physical input in a form suitable for implementation in numerical codes. The MICRA2009 workshop addressed problems in this area, and this special section of *Classical and Quantum Gravity* contains a number of articles describing progress on these topics. The talks presented at the workshop covered all of the most salient aspects of the subject, ranging from stellar collapse and supernova dynamics, to the nonlinear dynamics of isolated compact stars, to binary systems, to new approaches to the study of relativistic compact objects.

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