Foreword

This collection of articles summarize presentations made at the second conference on "Compact stars in the QCD phase diagram II" (CSQCD II) held at the Kavli Institute for Astronomy and Astrophysics at Peking University, Beijing, China, May 20 to 24, 2009. The conference organizers brought together leading nuclear physicists, particle physicists, and astrophysicists with a common interest in the multifaceted physics of compact stars and the structure of ultra-dense baryonic matter in the cores of such objects.

It is generally accepted that at the extraordinary densities that exist in the cores of compact stars, atomic nuclei are squeezed so tightly together that new particle states are generated and novel states of matter are produced. The most spectacular phenomena stretch from the generation of hyperons and baryon resonances, to the formation of meson condensates, to quark deconfinement. There is also the very intriguing possibility that compact stars are made of absolutely stable strange quark matter, a configuration of matter that would be more stable than ordinary nuclear matter. In the latter event, compact stars would be largely composed of strange quark matter rather than confined hadronic matter. The interest in the physics and astrophysics of quark matter has received a boost from the recent discovery that quark matter ought to be a color superconductor. All this comes at a time where new orbiting observatories have extended our vision tremendously, allowing astronomers to observe astrophysical objects and phenomena with an unprecedented clarity and angular resolution that previously were only imagined, enabling scientists for the first time ever to perform detailed studies of large samples of galactic and extragalactic objects. On the Earth, radio telescopes and instruments using adaptive optics and other revolutionary techniques have exceeded previous expectations of what can be accomplished from the ground, and gravitational wave detectors are opening up a new window for the detection of gravitational waves emitted from compact stellar objects. In short, there has never been a more exciting time in the modern astrophysics, both observational as well as theoretical, than today.

The papers in these conference proceedings reflect this excitement. They guide the reader through a broad range of fascinating research topics on compact stars, bearing impressive testimony to the interdisciplinary nature of modern astrophysics, which the reader will enjoy.

On behalf of all members of the organizing committee of CSQCD II, I would like to thank all authors and participants for their excellent contributions to the proceedings of this conference.

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