Advances in High Energy Physics

Special Issue on

Classical and Quantum Gravity and Its Applications

CALL FOR PAPERS

After discovery of accelerated expansion of the universe in 1998, understanding its theoretical reasons presents one of the fundamental open questions in physics. Identifying the cause of this late time acceleration is a challenging problem in cosmology. Physicists are interested in considering this accelerated expansion in a gravitational background and they proposed some candidates to explain it. Modifying general relativity opens a way to a large class of alternative theories of gravity ranging from higher dimensional physics to nonminimally coupled (scalar) fields. On the other hand, one of the interesting dreams of physicists is finding a consistent quantum theory of gravity. Although there are a lot of attempts to join gravity and quantum theories together, there is no complete description of the quantum gravity. The main idea of promoting general relativity to a quantum level scenario is one of the big challenges of our century.

The fact that gravitational collapse is the dominant mechanism in formation of massive objects motivates one to study its various properties. It has been predicted that gravitational collapse of massive objects may lead to the formation of singularities. The recent observational evidences of Laser Interferometer Gravitational-Wave Observatory (LIGO) confirm not only the existence of gravitational waves but also the life of black holes.

From the other side, an interesting topic in multidisciplinary branches of theoretical physics is to study relation between a certain types of gravity models and quantum systems, called gauge/gravity duality or AdS/CFT. It is believed that this approach is able to explain all quantum phase transitions of systems using a unique and well-defined dictionary. For example, we can compute the entanglement entropy of a many body quantum system using the solutions of gravitational action in a higher dimensional asymptotically AdS space time. Furthermore, quantum information metric or fidelity and other condensed matter phenomena could be explained by this purely geometric approach using the classical black hole solutions. Different experimental data in labs supported this idea to treat strongly correlated quantum systems using the gravitational sector of a weakly coupled system.

The purpose of this special issue is to publish high-quality research papers as well as review articles addressing recent advances on classical and quantum theoretical models of gravity and their applications.

Potential topics include, but are not limited to:

- Einstein and alternative theories of gravity and their applications
- Black holes and other massive objects in classical point of view
- Black holes and other massive objects in quantum point of view
- Gravitational waves
- Gauge/gravity duality, black holes and AdS/CFT correspondence, and their applications
- Entanglement entropy and quantum information metric
- TOV and its modifications for massive objects
- Cosmology based on various gravitational theories

Authors can submit their manuscripts via the Manuscript Tracking System at http://mts.hindawi.com/submit/journals/ahep/cqg/.

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Manuscript Due
Friday, 2 September 2016

First Round of Reviews
Friday, 25 November 2016

Publication Date
Friday, 20 January 2017