

## Special Issue on Quantum Gravity and Early Universe Cosmology

# CALL FOR PAPERS

One of the most promising areas in which quantum gravity can lead to observable phenomena is in the cosmology of the early universe, where energies far above those reached in Earth-based experiments were important. This makes the development of cosmological models from fundamental theories of quantum gravity attractive for quantum gravity practitioners, who want to test their theories and empirically distinguish between different approaches. It can also lead to new input for theoretical cosmology, addressing open issues there.

Regarding inflation, the most successful paradigm for describing the early universe, one can hope that quantum gravity would constrain at the theoretical level the existing variety of inflationary models, as the details of inflation are sensitive to Planck-scale physics; observationally, a wide range of measurements can be explained by a variety of inflationary models, so further input from the theoretical side is needed to avoid questions of fine-tuning and predictivity. In addition, one of the crucial problems of classical gravitational theory, namely, the initial singularity, is not resolved by inflation. While in practical calculations such issues can often be ignored, one would eventually like to reach a deeper understanding explaining the origin of some successful model(s) of inflation within a theory of quantum gravity or replace inflation altogether by a different paradigm embedded in quantum gravity.

This special issue aims at collecting and exploring work on the connections of early universe cosmology and quantum gravity. The very tight observational constraints given by recent CMB experiments, that is, Planck and WMAP, combined with prospects for detecting primordial gravitational waves in future missions, add to the growing interest in this topic and the theoretical need to complete our understanding of the early universe.

Potential topics include but are not limited to the following:

- ▶ Inflation models connected to quantum gravity: inflation in string theory, supergravity and related constraints (embedding, moduli stabilization, etc.), quantum gravity constraints (e.g., weak gravity conjecture), and metastable de Sitter vacua
- ▶ Symmetry reduced models for quantum gravity, in particular loop quantum cosmology
- ▶ Cosmology as a macroscopic phase of quantum gravity (e.g., in group field theory)
- ▶ Asymptotic safety scenarios for cosmology
- ▶ Holographic cosmology
- ▶ Cosmological approaches in connection to quantum gravity (e.g., effective field theory, non Gaussianities, speed of sound, etc.)
- ▶ Nonsingular bounce scenarios motivated from quantum gravity
- ▶ Models exploring phenomenological aspects of quantum gravity (e.g., extra dimensions, modified dispersion relations, and varying space-time dimension) in cosmology
- ▶ Early universe scenarios in modified gravity theories motivated by quantum gravity (e.g., Hořava-Lifshitz cosmology)

Authors can submit their manuscripts through the Manuscript Tracking System at <http://mts.hindawi.com/submit/journals/ahp/geuc/>.

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