

## GR 1: Hauptvorträge Montag: Quantengravitation und Quantengravitationsphänomenologie

Zeit: Montag 14:00–16:15

Raum: 30.45: 101

**Hauptvortrag** GR 1.1 Mo 14:00 30.45: 101  
**Small-scale structure of spacetime: Simple models and experiments** — •FRANS R. KLINKHAMER — Institute for Theoretical Physics, University of Karlsruhe, Karlsruhe Institute of Technology

An elementary discussion of a possible nontrivial small-scale structure of spacetime is presented. Current and future experimental constraints from astroparticle physics are reviewed.

**Hauptvortrag** GR 1.2 Mo 14:45 30.45: 101  
**The Asymptotic Safety Scenario in Quantum Gravity** — •FRANK SAUERESSIG — Institute of Physics, University of Mainz, D-55099 Mainz, Germany

Asymptotic safety offers the possibility that gravity constitutes a consistent and predictive quantum field theory within Wilson's generalized framework of renormalization. The key ingredient of this scenario is a non-trivial fixed point of the gravitational renormalization group flow which governs the UV behavior of the theory. The fixed point itself thereby guarantees the absence of unphysical UV divergences while its associated finite-dimensional UV-critical surface ensures the predictivity of the resulting quantum theory.

This talk will summarize the evidence for the existence of such a fixed point, which emerged from the flow equation for the effective average action, the gravitational beta-functions in  $2 + \epsilon$  dimensions, the 2-Killing vector reduction of the gravitational path-integral and lattice simulations. Possible phenomenological consequences will be discussed in detail.

**Hauptvortrag** GR 1.3 Mo 15:30 30.45: 101  
**Dynamics and diffeomorphism symmetry in discrete quantum gravity** — •BIANCA DITTRICH — AEI, Potsdam, Germany

Diffeomorphism symmetry is the underlying symmetry of general relativity and deeply intertwined with its dynamics. The notion of diffeomorphism symmetry is however often obscured in discrete gravity, which underlies most of the current quantum gravity models. We will propose a notion of diffeomorphism symmetry in discrete models and find that such a symmetry is weakly broken in many models. We will explain the connection to the problem of finding a consistent canonical dynamics for discrete gravity. To overcome these problems we will discuss methods to construct models with exact symmetries via so called perfect actions which involves a renormalization group analysis of the discrete quantum gravity models.