Physikalisches Institut
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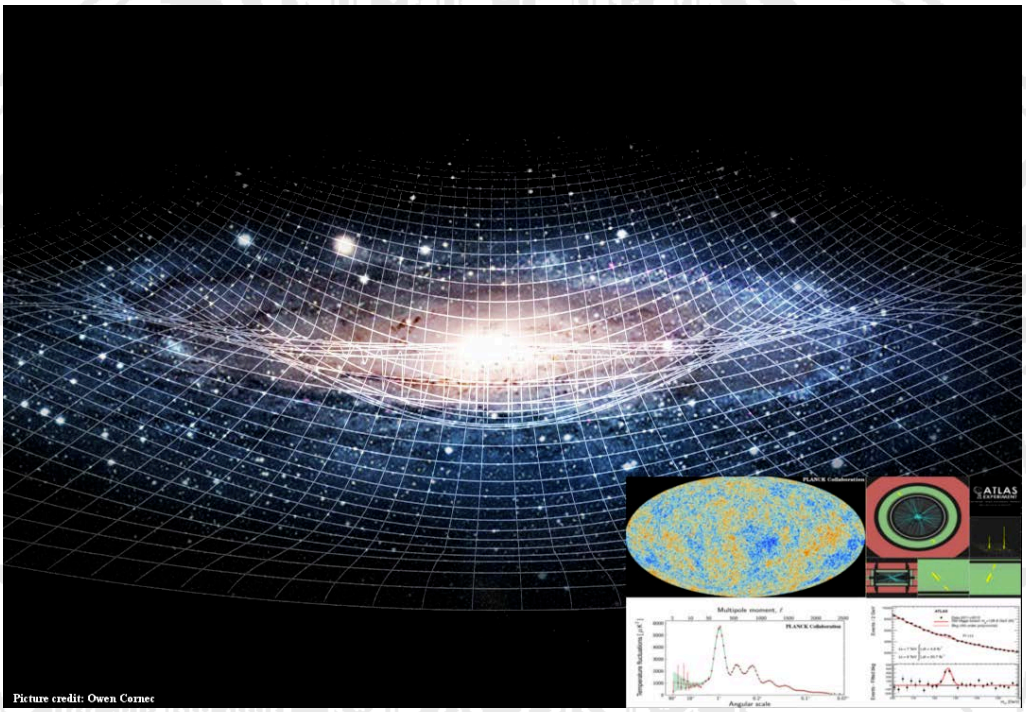
Albert-Ludwigs-Universität Freiburg

PHYSIKALISCHES KOLLOQUIUM

AM 16. APRIL 2018 UM 17 UHR C.T.

IM GROßEN HÖRSAAL



QUANTUM FIELDS AND GRAVITY – A UNIFIED PERSPECTIVE

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The universality of the gravitational interaction is reflected by its geometrical character, which ultimately leads to a dynamical description of curved spacetime in Einstein's classical field theory. In contrast, matter is described by quantum fields, whose mutual interactions are organized in the Standard Model of particle physics. While gravitational effects may be safely ignored in Earth-based collider experiments, they are important in cosmology - in particular in strong curvature regimes, such as during inflation, where the early universe underwent a phase of accelerated expansion. For energies close to the Planck scale it is expected that quantum gravitational effects are dominant and a quantum theory of gravity is needed. I discuss several fundamental aspects related to quantum theories of gravity and argue that the Standard Model of particle physics as well as the physics of the early Universe can both be effectively described in one unified model.