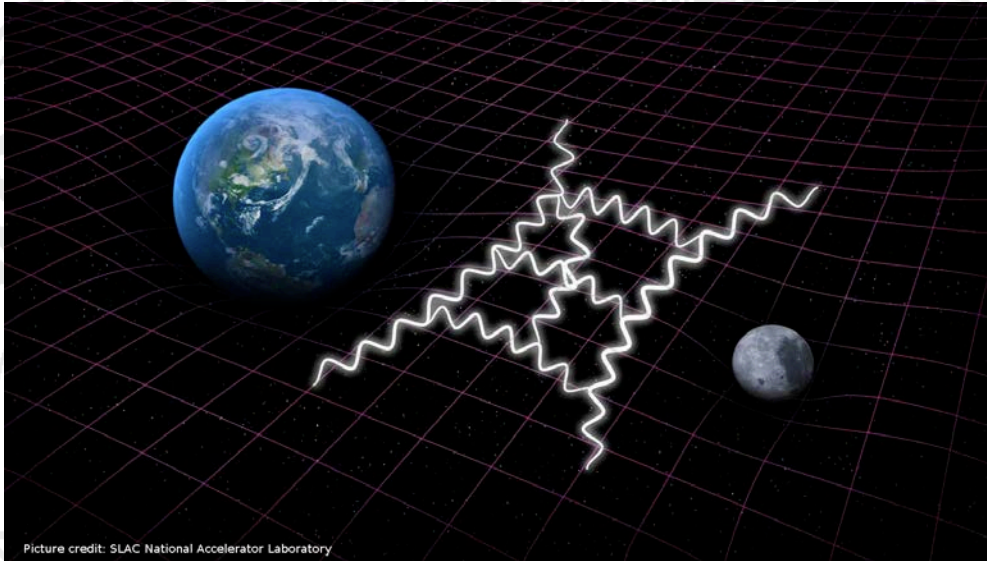


PHYSIKALISCHES KOLLOQUIUM

AM 6. MAI 2019 UM 17 UHR C.T.

IM GROßEN HÖRSAAL



Picture credit: SLAC National Accelerator Laboratory

TOWARDS A UNITARY AND RENORMALIZABLE QUANTUM THEORY OF GRAVITY

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For any fundamental local quantum field theory, unitarity, renormalizability, and relativistic invariance are considered to be essential properties. Unitarity is inevitably connected to the probabilistic interpretation of the quantum theory, while renormalizability guarantees its completeness. Relativistic invariance, in turn, is a symmetry which derives from the structure of spacetime. So far, any perturbative attempt to formulate a fundamental quantum field theory of gravity seems to be in conflict with at least one of these three properties. In quantum Lifshitz theories -- quantum field theories with an anisotropic scaling between space and time -- unitarity and renormalizability can be retained while Lorentz invariance is sacrificed and only emerges as approximate symmetry at low energies. I discuss several advancements towards the construction of a unitary and renormalizable quantum Lifshitz theory of gravity.