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Gravitational corrections to the gauge couplings beta functions

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The quantized gravitational field theory for small fluctuations around the flat metric is non-renormalizable, i.e., an unlimited number of free parameters is required to absorb all types of divergences that arise order by order in perturbative calculations. On the other hand, quantum effects of gravity at low energies, much smaller than the Planck scale, can be computed in the spirit of an effective field theory. From this viewpoint, it has been proposed that gravitational quantum corrections may cause gauge theories to become asymptotically free, regardless of whether these theories exhibit such a property in the absence of gravity. Although the effective field theory of gravity is well-defined as a quantum field theory, some details arise when applied to the study of renormalization group equations. In this seminar, we will discuss this issue and present some recent results of gravitational corrections to gauge couplings beta functions.