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Gravity-mediated matter scattering amplitudes from the effective action

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One of the goals of the Asymptotic Safety program for gravity is to compute the effective action at $k=0$. However, given such an action, what are the concrete physical predictions that we can derive from it? Generically, the renormalization group will generate an infinite number of interactions in the effective action. It is therefore an interesting question which interactions can arise, and how they affect physical observables. In this talk, I will present a classification scheme to parameterize the infinitely many interactions using form factors. These take into account the full momentum-dependence of propagators and vertices. Using 2-to-2 scattering processes involving scalars and photons as a starting point, I will show how to derive the most general scattering amplitudes and cross-sections from the effective action. Taking the low-energy limit, this allows to parameterize the smoking gun signals for quantum gravity in these observables.

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