

Theory: Renormalization and unitarity in an higher derivative scalar theory

Thursday, September 7, 2023 4:45 PM (15 minutes)

Higher derivative theories could give a resolution to the problem of renormalizability of quantum gravity as a quantum field theory. I will describe a simple shift symmetric scalar field model with a higher derivative kinetic term and discuss its main properties concerning unitarity and RG flow. The running of the parameters is found both by calculating the two-point and 4-point amplitudes in perturbation theory with dimensional regularization and by applying the Functional Renormalization Group. The analysis of the scattering amplitude also illustrates the Effective Field Theory phase of the theory, and displays a novel feature of the effective operators disappearing in the ultraviolet. Moreover, I will comment on the strong interactions which happen at high energy in such theory. The lessons learned have implications for Asymptotic Safety and for Quadratic Gravity

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Session Classification: Parallel Sessions