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Naturally small neutrino mass with asymptotic safety and gravitational-wave signatures

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I will discuss a dynamical mechanism to generate small neutrino masses, based on a UV completion through asymptotically safe gravity, in the standard model with right-handed neutrinos and in the B-L model. A small Dirac mass for the neutrinos appears more naturally in the B-L model compared to the standard model, when we account for quantum gravity corrections based on existing calculations. This mechanism can also accommodate Majorana neutrinos and pseudo-Dirac neutrinos, for various values of seesaw scale. I will discuss whether gravitational waves from first-order phase transition can distinguish these cases. In the presence of quantum scale invariance of the scalar potential – which is at odds with existing calculations in asymptotically safe quantum gravity – we find no gravitational wave signals. Forgoing this symmetry, we find an observable signal in new-generation space interferometers. However, its discriminating features are washed out due to the strong dependence of the gravitational-wave spectrum on the mass parameter of the scalar potential.

Presenter(s) : Mr CHIKKABALLI, Abhishek