

Gravitational Collapse in Scale-Dependent Gravity

Monday, 9 September 2024 16:30 (25 minutes)

In this talk we consider the Oppenheimer-Snyder (OS) gravitational collapse in the general framework of scale-dependent gravity. Recent investigations show that a spherically symmetric solution of asymptotically safe gravity, when considered for a negative ω -parameter (so, properly speaking, in scale-dependent gravity), develops a singularity at a finite non-zero radial coordinate. The inner geometry of the collapsing star is described, as usual, by the spatially flat Friedmann-Robertson-Walker (FRW) metric. We study in detail the proper time evolution of the event and apparent horizons. Matter is uniformly distributed without any assumptions about its equation of state. The outer asymptotically-safe/scale-dependent black hole metric is smoothly matched to the inner geometry, and this yields the energy density, pressure, and equation of state of the collapsing matter. Finally, the properties of the equation of state and the energy conditions are considered and discussed.

Primary author: SCARDIGLI, Fabio (Politecnico di Milano, Dipartimento di Matematica)

Co-author: LAMBIASE, Gaetano (Universita di Salerno, Dipartimento di Fisica)

Presenter: SCARDIGLI, Fabio (Politecnico di Milano, Dipartimento di Matematica)