Semiclassical stellar hydrostatic equilibrium

Julio Arrechea Rodríguez,1 Carlos Barceló,1 Raúl Carballo-Rubio,2,3 and Luis J. Garay4,5

1Institute of Astrophysics of Andalusia (IAA-CSIC), Glorieta de la Astronomía, 18008 Granada, Spain
2SISSA, International School for Advanced Studies, Via Bonomea 265, 34136 Trieste, Italy
3INFN Sezione di Trieste, Via Valerio 2, 34127 Trieste, Italy
4Department of Theoretical Physics, Complutense University of Madrid, 28040 Madrid, España
5Institute for the Structure of Matter (IEM-CSIC), Serrano 121, 28006 Madrid, Spain

Theoretical assumptions about the behaviour of gravitational collapse motivate the search for new forms of stellar equilibrium beyond classical general relativity [1]. In this talk we delve into the semiclassical regime, where the vacuum energy contribution to spacetime curvature gives rise to a plethora of scenarios, all of them avoiding the formation of a horizon. We will start reviewing classical hydrostatic equilibrium for stars composed by a perfect fluid of constant density. Such considerations will guide us in the exploration of the solutions to the semiclassical hydrostatic equilibrium equations [2]. We will describe and explain the various situations one encounters as a function of the compactness of the resulting structure. Although the model here considered is the simplest one can think of, it can serve as a cornerstone for the study of semiclassical stellar models with more realistic equations of state.
