RESEARCH TRAINING GROUP
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Tidal disruption clouds around boson stars

Abstract

In this work we studied the behavior of ideal gas clouds near boson stars (BS). Being the later described by a complex field scalar theory coupled to general relativity, BS can have a wide set of configuration, ranging from very compact objects to extremely extensive ones, with masses that go from atomic scale to the order of supermassive black-holes. For this reason they are also candidates for Black Hole Mimickers and of particular astrophysical interest [1]. On the other hand, these objects possess no hard surface nor event horizon, meaning that matter could pass through them. Tidal disruption events on these spacetimes would have then a peculiar nature, as studied on [2]. In order to approach this topic we have performed, using state-of-the-art numerical techniques accomplished by the Black Hole Accretion Code [3], 2D fully relativistic simulations taking as initial condition spherical clouds at rest with a Gaussian distribution of density in hydrodynamic equilibrium with the atmosphere. The simulations were run for five different spherically symmetric self-interacting BS, having those different compactness. A damped oscillatory behavior of the gas around the center of the BS was found. The results of these simulations will be discussed in this talk.

[1] H. Olivares et al., arXiv:1809.08682
[2] Z. Meliani et al., Class. Quant. Grav. 34, no. 22, 225003 (2017)
[3] O. Porth et al., Comput. Astrophys. Cosmol. 4, 1 (2017), doi:10.1186/s40668-017-0020-2