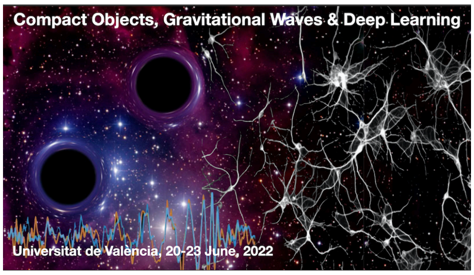

Contribution ID: **68** Type: **not specified**

Impact of ultralight bosonic dark matter on the dynamical bar-mode instability of rotating neutron stars

Wednesday 22 June 2022 17:50 (20 minutes)

We investigate the effects ultralight bosonic field dark matter may have on the dynamics of unstable differentially-rotating neutron stars prone to the bar-mode instability. To this aim we perform numerical simulations in general relativity of rotating neutron stars accreting an initial spherically symmetric bosonic field cloud, solving the Einstein-(complex, massive) Klein Gordon-Euler and the Einstein-(complex) Proca-Euler systems. We find that the presence of the bosonic field can critically modify the development of the bar-mode instability of neutron stars, depending on the total mass of the bosonic field and on the boson particle mass. In some cases, the accreting bosonic field can even quench the dominant l = m = 2 mode of the bar deformation by dynamically forming a mixed (fermion-boson) star that retains part of the angular momentum of the original neutron star. However, the mixed star undergoes the development of a mixed bar that leads to significant gravitational-wave emission, substantially different to that of the isolated neutron star. Our results indicate that dark-matter accretion in neutron stars could change the frequency of the expected emission of the bar-mode instability, which would have an important impact on ongoing searches for continuous gravitational waves.

Presenter: DI GIOVANNI, Fabrizio (University of Valencia)