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Searching for dark matter through observations of compact stars and detections of cosmic rays

Thursday 27 July 2023 11:10 (30 minutes)

In this talk I will first present a review of the state-of-the-art physics of compact stars and then discuss the possibility of detecting dark mattermin their interior or in their vicinity. As an application I will consider the uniform rotation of compact stars admixed with dark matter, which also feature an extended halo. As a particular example I will discuss the rotation of such compact stars bearing the dark matter halo. For the derived results, the relativistic mean field model equation of state DD2 has been used. The resulting configurations contain a typical dark matter to baryonic matter fractions of the order up to 3%. I will provide a discussion on astrophysical scenarios that provide compact stars constraints like from the detected fastest rotating neutron star, the possible mergers of compact stars with dark matter halos, and modifications to the cooling of compact stars. Finally I will address the possibility of detecting dark matter through detections of cosmic rays, particularly focusing in cosmic ray ensembles which are potentially detectable by the CREDO experiment.

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