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Dark Matter Searches Through Multi-Messenger Observations of Compact Stars

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The purpose of this talk is to discuss the possibility of detection of dark matter through multiple observations of compact stars and related phenomena. Recent scientific and technological developments have allowed for a better study of the nature of these astrophysical objects, in particular of the equation of state (EoS). As we advance on the quest for clarification of the neutron star internal content, we will be able to reveal or discard the existence of dark matter in the corresponding stellar environments. In one hand, new channels of multi-messenger observations like gravitational radiation from merger events of binary systems of compact stars or radio and X-ray signals from isolated pulsars have revealed their most basic structural properties like mass, radius, compactness, cooling rates and compressibility of their matter. In the other hand, nuclear measurement and experiments have narrowed the EoS uncertainty in the lowest to intermediate density range. Importantly, there exist several types of violent, transient energetic emissions associated not only with the strong magnetic fields and extreme gravity in the proximity of these objects but with explosive, evolutionary stages often triggered by mass accretion from companion stars. Therefore, we expect that the presence of dark matter will leave an imprint in the many kinds of detected signals from compact stars.

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