

Spring 2022 Colloquium

Department of Physics & Astronomy, A&M-Commerce

Feb 10, Thursday, 4-5 PM

Live Zoom Meeting

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Astrophysics

Neutron stars in the era of multi-messenger astronomy

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Prof. Débora Menezes earned BS (1983) and MS (1986) degrees in Physics at the University of São Paulo and a Ph.D. degree (1989) in Physics at the University of Oxford. Her Ph.D. research topic was on nuclear physics. In 1992, Dr. Débora began her appointment as an assistant professor at the Federal University of Santa Catarina (southern Brazil) where she was the Vice-President for Research and Outreach Programs from 2008 to 2012. She is currently the President of the Brazilian Physical Society. Her research interests are nuclear and high energy physics with applications in astrophysics. More information about Prof. Débora can be found at www.fsc.ufsc.br

Abstract

A neutron star was first detected as a pulsar in 1967. It is one of the most mysterious objects in the universe, with a radius of the order of 10 km and masses that can reach two solar masses. In 2017, a gravitational wave was detected (GW170817) and its source was identified as the merger of two neutron stars. The same event was seen in X-ray, gamma-ray, UV, IR, radio frequency and even in the optical region of the electromagnetic spectrum, starting the new era of multi-messenger astronomy. To understand neutron stars, an appropriate equation of state that satisfies bulk nuclear matter properties has to be used and GW170817 has provided some extra constraints to determine it. Moreover, the NICER telescope, launched in 2017, has also started (in 2021) to send information that helps us determine the radius of these compact objects.

I will show how the minuscule world of the nuclear particles and their models can be useful to the understanding of the cosmos through some stellar remnants, which can merge and generate gravitational waves, finally detectable.