SACRAMENTO STATE

Department of Physics and Astronomy

FALL 2023 Colloquium Series

"Towards Precision Measurements of Dark Matter from Acceleration Measurements and Direct Distances"

Dr. Sukanya Chakrabarti

University of Alabama in Huntsville

For more than a century now, our understanding of dark matter in the Galaxy has been based on estimates of the accelerations of stars from a snapshot of the positions and speeds of stars. These estimates can be inaccurate for a time-dependent potential, and there are now many lines of observational evidence that show that our Galaxy has had a highly dynamic history. Technological advances now make it possible for us to carry out extreme-precision time-series measurements of the acceleration of stars that live within the gravitational potential of our Galaxy. I will talk about several different methods of direct acceleration measurements that we have developed, including our recent analysis of compiled pulsar timing data from which we were able to measure the Galactic acceleration for the first time, and derive fundamental Galactic parameters. There are testable differences between popular models of dark matter on small scales, i.e., in their sub-structure. I will discuss the potential for measuring dark matter sub-structure in the Milky Way with pulsar timing and eclipse timing, and for constraining theories of gravity by combining constraints from pulsar timing and extreme precision radial velocity measurements. I will end by talking about our recent work in producing a new HI map that does not rely on kinematic distances.

Thursday, September 7, 2023

4:00 – 5:20PM

MND1015

Open & Free to all students, faculty and public