DEPARTMENT OF
PHYSICS &
ASTRONOMY

# Physics & Astronomy
## Colloquium


## Dr. Sukanya Chakrabarti

The University of Alabama in Huntsville


**3:30 - 4:30 p.m. | Tuesday, Feb. 25**

**Science Building 234**

### The Precision Frontier of Dark Matter Constraints from Direct Acceleration Measurements


For over a century, our understanding of dark matter has hinged on kinematic estimates derived from a snapshot of the positions and speeds of stars. However, this analysis is inaccurate for a time-dependent potential, and there are now many lines of evidence that show that our Galaxy has had a highly dynamic history. Recent technological advances now enable us to carry out extremely precise time-series measurements of the acceleration of stars that live within the gravitational potential of our Galaxy. I will discuss our comprehensive observational strategy to directly measure Galactic accelerations. Central to this discussion is 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. Discernible differences in sub-structure exist among popular dark matter models on small scales, presenting testable nuances. I will discuss the potential for measuring dark matter sub-structure in the Milky Way by leveraging the set of techniques we have developed, including pulsar timing, eclipse timing, and extreme-precision radial velocity observations. I will review initial results from our multi-pronged observing campaign, and end by discussing synergies between Galactic dark matter constraints and constraints on theories of gravity.


**Refreshments at 3 p.m. | SC 103**