



PHYSICS AND ASTRONOMY SEMINAR

Dr. Elena D'Onghia

University of Wisconsin, Madison

“Spiral Waves and Wobbles in Galactic Disks”

Abstract

The precise nature of spiral structure in galaxies remains uncertain. Using high-resolution N-body simulations, I follow the motions of stars under the influence of gravity, and show first that mass concentrations with properties similar to those of giant molecular clouds or clumps of gas and holes in the ISM can both induce the development of spiral arms through a process termed swing amplification. However, unlike in earlier works, the eventual response of the disk is highly non-linear, significantly modifying the formation and longevity of the resulting patterns. I will discuss how these findings affect many phenomena, from the disk heating, to radial migration. I will also show the effects of impacts of dark matter clumps on the disk as predicted by the current cosmological framework that can wobble the disk, heating it and eventually exciting spiral waves and rings. These models predict an "arm morphological classification" of disk galax