QPhysics
AT QUEENS COLLEGE

Colloquium Notice

Ricardo Herbonnet

SUNY Stony Brook

Studying the Universe by weighing its biggest inhabitants

In the last few decades astronomical observations have revealed the strange nature of the Universe. Observations of phenomena at vastly different ages of the Universe consistently require more than baryonic matter and baryonic physics to be explained. Both dark energy, the cause of the accelerated expansion of the Universe, and dark matter, mostly responsible for the gravitational build-up of large scale structure in the Universe, have, to date, no clear physical explanation. By putting strong limits on the energy density of these dark components with astronomical observations, theoretical models of dark matter and dark energy can be tested and refined.

A promising tool is to study the growth of structure through cosmic time. Higher density of dark matter in the Universe leads to more clustered matter distributions at the present time, whereas dark energy pulls these structures apart. Therefore, by measuring the number and mass of large objects in the Universe, we can determine the energy density of the dark components. The largest objects in the Universe are galaxy clusters and their rarity makes them a very powerful probe of cosmology. Approximately 85% of the mass of clusters is in the form of dark matter and and requires a probe of gravitating mass to be weighed. Mass estimates based on the baryonic content of the cluster are known to be biased from simulations, but gravitational lensing provides the tool to measure an unbiased total mass of dark matter and light-emitting matter. The combination of gravitational lensing with baryonic mass proxies is the key to galaxy cluster cosmology.

I will review how galaxy clusters are found and discuss the latest gravitational lensing measurements of galaxy clusters and their impact on cosmology.

Monday
November 2, 2020
Starts at **12:15 pm**
Physics Conference Room, SB B326