PHYSICS AND ASTRONOMY

SEMINAR

Dr. Benoit Côté,

MSU and Konkoly Observatory, Budapest

"Probing the Origin of r-Process Elements and Isotopes in the Milky Way"

Abstract

"Galactic chemical evolution simulations are powerful tools to probe the origin of the elements. For the evolution of r-process elements, however, different modeling assumptions regarding the properties of r-process sites (e.g., rate and ejecta of neutron star mergers and rare classes of supernovae) can lead to similar chemical evolution predictions. Therefore, such predictions should not be seen as the final answer, but rather as a diagnostic tool. In order to build a coherent picture of where, when, and how r-process elements have been synthesized in our Galaxy, the conclusions extracted from chemical evolution studies must be compared and combined with the messages sent by other fields of research. In this talk, I will present our effort to connect nucleosynthesis and chemical evolution studies with the gravitational wave detections of LIGO/Virgo, to quantify whether neutron star mergers can be the dominant source of r-process elements in the Universe. I will also present the challenges of reproducing the chemical evolution trends of europium, gadolinium, and dysprosium in the Galactic disc with neutron star mergers only, given the constraints provided by short-gamma ray bursts, population synthesis models, and the host galaxy of GW170817. I will also discuss how we can (in theory) use r-process nucleosynthesis calculations and the Solar isotopic composition to quantify the relative contribution of different r-process sites, and how nuclear physics uncertainties affect this research. Finally, I will present our efforts and plans to simulate the early Universe in order to better interpret the various levels of r-process enrichments observed in metal-poor stars."

Friday, May 3, 2019

11:30 a.m.

Elliott Building – Room 161