PHYSICS COLLOQUIUM:

Galaxy Encounters: From the Interstellar Medium to the Cosmic Web

Date: **9/6/19**

Time: **10:30 AM**

Location: **COB2 140**

Jorge Moreno

Assistant Professor, Physics and Astronomy

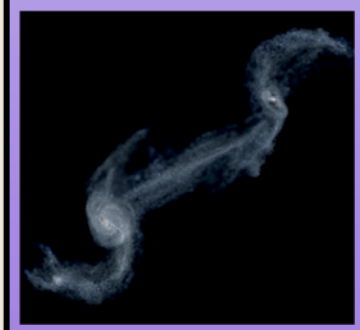
Pomona College

For more information, contact : **Kinjal Dasbiwas**

kdasbiwas@ucmerced.edu

Abstract

In this talk I will review the role of galaxy mergers in triggering star formation, and their effect on the interstellar medium. For many years, observations have suggested that star formation is enhanced in mergers. Recently, however, a number of IFU campaigns and HI-survey suggest that mergers also enhance the H2 budget in galaxies, whilst leaving its HI content largely unaffected. Understanding how baryons migrate between ISM phases and/or become stars is a questions that has eluded us, because of lack of sufficient resolution in our simulations or lack of sophisticated models at scales both relevant to galaxies and the ISM. I will share recently published results where we employ a comprehensive suite of parsec-scale galaxy merger simulations using FIRE, the "Feedback In Realistic Environment" physics model. This framework allows us to resolve Giant Molecular Clouds and follow feedback physical processes that regulate star formation. I will describe the ISM as a pipeline where atomic gas can cool and compress into molecular gas, but the onset of star formation can turn these ISM components into warm ionized gas, or hot gas (with temperatures above 1 million Kelvin). The net result is the build-up of a molecular gas reservoir, hand in hand, with enhanced star formation - thus providing a physical picture to H2 and HI observations. Ultimately, this baryon cycle plays a key role in building up stellar bulges in galaxies. If time allows, I will describe work by my students using this merger suite, and using IllustrisTNG, a modern cosmological simulation of galaxy evolution.



About the Speaker

Professor Moreno is a theoretical astrophysicist at Pomona College whose work focuses on using high-performance computing to investigate star formation in galactic collisions. This research has resulted in several high-impact research articles, almost 1-million dollars in research funding, over 80 invited colloquia worldwide, and the 2019 Joseph Morgan Physics Prize Lectureship. Professor Moreno is also an award-winning teacher, and is the recipient of the 2019 SACNAS Outstanding Mentor Award. Born and raised in a low-income family in Mexico, and being one of the few non-binary “Latinx” de-Indigenized astrophysicists in the world, Professor Moreno has made it his life mission to incorporate lessons learned from activism in every space he inhabits. After serving the American Astronomical Society as Chair of the Committee on the Status of Minorities in Astronomy, he is now focusing his labor towards the decolonizing of his classroom, his research group, and the field of astronomy. In his free time, he enjoys running, reading, and cooking for his family.