PHYSICS

PHYSICS COLLOQUIUM

February 19; 4pm; Rm 118 Nieuwland

Bridging Galaxy Evolution Across Cosmic Time: Tracing the Interplay Between Massive Stars and Their Surrounding Gas with Spectroscopy

Dr. Danielle Berg

Department of Astronomy, The Ohio State University

The first stars and galaxies initiated the epoch of reionization (EoR) - the period that rendered our Universe transparent and allowed us to observe its phenomenon - and provided the seeds from which all galaxy evolution grew. Knowledge of the properties of these galaxies are needed to understand the ionizing photon production and escape responsible for the EoR, and will provide the crucial missing link needed to weave a coherent picture of galaxy evolution. I will present several programs that are establishing the needed framework to interpret the properties of galaxies from z~0–10, bridging the present-day and early universe. These programs use multi-wavelength spectroscopy to disentangle the spectral signatures that characterize the interplay between massive stars and their surroundings, and allow us to interpret how radiative processes shape galaxies. I will show how precise measures of the stellar and nebular properties of both nearby and distant lensed galaxies directly link the ionizing stellar populations with the baryon+metal (gas) feedback cycle and the conditions of ionizing photon production and escape. My studies provide a detailed foundation of the diversity of local star-forming galaxies with which to interpret cosmic evolution, as well as unique laboratories of nearly pristine gas in which to test conditions analogous to the first galaxies. In preparation for the coming UV window onto the early universe with the advent of the James Webb Space Telescope and the extremely large telescopes, I will introduce the COS Legacy Archival Spectroscopic SurveY (CLASSY) - an upcoming large Hubble Space Telescope program that will produce the first high-resolution UV spectral atlas of star-forming galaxies. CLASSY will calibrate new tools that will allow us to completely describe the stars, circumgalactic medium, and interstellar medium of galaxies across redshift, setting the stage to study cosmic origins, ionizing production, and the evolution of galaxies in a unified framework.