Astrophysics Seminar

Lyman Alpha and Ionizing Radiation Emission from Stars and Galaxies

Instruments and Techniques for Mapping Emission in the Far-UV

Tuesday

March 7

12:30 P.M.

Rm 184 NSH

Dr. Brian Fleming

Research Scientist, University of Colorado

The Epoch of Reionization occurred when a large flux of hydrogen ionizing Lyman Continuum (LyC) radiation was emitted into the inter-galactic medium (IGM). The first stars in the first galaxies are one of the leading candidates as the source of this radiation, however direct measurement of the ionizing flux from these sources is impossible due to the opacity of the IGM at this epoch. We currently rely on observations of galaxies at redshift $z \sim 3$ as lower redshift analogs to inform reionization models. Such measurements lack the angular resolution necessary to understand the local conditions that enable the radiation to escape the dense neutral hydrogen clouds in which stars form. I will argue that comprehensive spectral mapping of galaxies in the far-UV is necessary to truly understand LyC escape. I will then present the results of an imaging campaign with the Hubble Space Telescope to measure the Lyman alpha emission from a sample of low redshift ($z = 0.02 – 0.05$) galaxies that may provide an important calibration for future JWST observations at the Epoch of Reionization. I will use this data to highlight the limitations of current far-UV resources and present some of the technology development I am leading to address those issues, including advanced mirror coatings and two new technologies to enable integral field spectroscopy in the far-UV for the first time. The potential impact of these advancements on future NASA missions will be discussed, including SISTINE, an instrument in development at the University of Colorado, and the NASA flagship concept LUVOIR.