Probing Cosmic Origins: Ultraviolet Spectroscopy with the Cosmic Origins Spectrograph

The Cosmic Origins Spectrograph (COS), an ultra-sensitive ultraviolet spectrograph, was successfully installed on the Hubble Space Telescope during Servicing Mission 4 in 2009. COS covers the 1150 -- 3200 Å range with moderate spectral resolution (R~20,000) at sensitivities that are 2 to 30 times better than the previous capabilities on HST. Due to its low FUV background, COS has up to 100 times more observing efficiency for faint targets. The unprecedented sensitivity of COS has opened up new parameter space for surveys in a number of science fields united by the theme of probing cosmic origins, from the atmospheres of solar system bodies out to the large scale structure of the modern universe. More than 200 papers based on COS data have been published in the refereed literature to date. In this talk, Dr. Froning will present the history of designing, constructing, installing, and using COS. She will focus on science results from the first five years of COS operations, including observations of the extended atmospheres of transiting hot Jupiters; probes of the link between accretion and outflow from black hole X-ray binaries to AGN; and highlights of surveys of the local intergalactic medium, from the spatial studies of IGM filaments, through observations of the He II epoch of reionization, to the first probes of the diffuse IGM at overdensities comparable to those regularly studied at higher redshifts.