Hubble Space Telescope

Cycle 16 AR Proposal

Highly Ionized Plasma in the Milky Way: A Benchmark for Feedback Studies in the Universe

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Abstract

We propose to produce an homogeneous study of the high-resolution STIS E140H (1.5-2.7 km/s resolution) spectra of the interstellar Si IV, C IV, and N V absorption along 26 extended Galactic sight lines to study the properties of highly ionized gas in the Milky Way. Absorption from these Òhigh ionsÓ is used to probe hot gas from the Milky Way to high-redshift primordial galaxies. However, only in our own Galaxy have they been observed with high enough spectral resolution to fully resolve the line profiles. Such observations have revealed surprisingly narrow absorbing clouds that would not have been identified at lower resolution and that likely trace non-equilibrium cooling or photoionization of feedback-driven gas. The sight lines chosen for study in this work sample a variety of physical environments or structures (e.g., the lower Galactic halo, H I shells and supershells, spiral arm and interarm gas, and evolved supernova remnants). The very high resolution of the observations to be analyzed will allow us to derive properties for the individual physical clouds connected to such structures and to study effects unobservable at lower resolutions where the clouds are smeared together. Our survey has three main goals: 1) to produce an homogeneous reduction and analysis of the archival E140H spectra of these stars; 2) to determine the primary ionization mechanisms responsible for the highly ionized gas in various physical environments in the Milky Way; 3) to understand the physical origins of the different types of highly-ionized gas so that the signatures seen in the Milky Way might be used for understanding highly ionized gas in the halos of neighboring galaxies, in starburst outflows, and in primordial galaxies.

Investigators:

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Number of investigators: 3

Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
STIS	26	FTP	26/d