

An Archival Study of Solar-System-Scale Interstellar Structure

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Abstract

The evidence for significant solar-system-scale (< 100 AU) structure in the diffuse ISM has increased dramatically over the past decade through multi-epoch H I 21 cm and optical Na I absorption-line observations of various extragalactic, pulsar, and stellar sightlines. Possible explanations for this structure range from small-scale filamentary geometries to fractal geometries driven by turbulence to a separate population of small, dense self-gravitating clouds. The latest Na I data now indicate that the solar-system-scale Na I structure is most common in the vicinity of dynamic interstellar regions. However, the physical interpretation of this structure is unclear because Na I is not the dominant Na ion in H I clouds. Such a detailed understanding requires the diagnostic power of the rich diversity of interstellar species observable in the UV. We have identified 13 objects in the HST data archive with multi-epoch STIS echelle observations of UV interstellar absorption lines. We propose to analyze the interstellar lines in the 212 datasets comprising these observations and probe the physical character of any temporal profile variations. Our specific goals in this archival study are to assess the extent of solar-system-scale structure in the H I gas as well as the thermal gas pressure, electron density, and dust content of any observed structure.

Investigators:

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Number of investigators: 2

Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
STIS	212	FTP	50 datasets/month