17.06

**SPINR — A System for Three Dimensional Ultraviolet Imaging Spectroscopy of Interstellar Gas and Dust**

T.A. Cook, V.J. Taylor, S. Chakrabarti (Boston U.)

We are currently constructing the Spectrograph for Photometric Imaging with Numeric Reconstruction (SPINR) for high spectral resolution (5Å over a 900 to 1400Å bandpass) imaging of the Scorpius region from a sounding rocket. The system is designed to map (in two spatial dimensions and one spectral dimension) the ultraviolet spectral properties of a ten by ten degree field using a novel spinning spectrograph technique. We discuss the design and status of the hardware as well as simulations of the software needed to convolve the data.

By using SPINR to measure the spectral properties of the scattered light from the interstellar medium (ISM) as well as the absorption spectra to the collection of stars at different depths in the field we can constrain the physical properties of the ISM more closely than with either method alone.

17.07

**Recent Results from the Antarctic Submillimeter Telescope and Remote Observatory (ASTRO)**

T.M. Bania, J.M. Jackson, A.D. Bolatto, M. Huang, J.G. Ingalls (Boston U.), S. Balm, A.P. Lane, A.A. Stark (CfA), J. Staughun, J. Stutzki (Cologne)

The Antarctic Submillimeter Telescope and Remote Observatory (ASTRO) is a 1.7 m diameter off-axis submillimeter-wave telescope operating at the South Pole. Since its installation in the 1994-95 austral summer, ASTRO has been observing the [C I] 492 GHz fine-structure line toward a variety of Galactic and extragalactic objects. The goal is to investigate the photodissociation of molecular gas by ultraviolet radiation in a broad range of physical environments.

This poster summarizes the major scientific results thus far. (1) To investigate a low-metallicity environment, we have detected and analyzed the [C I] emission from the Magellanic Clouds. (2) We determine the scale height of [C I] emission in the Galaxy by measuring several strips at constant Galactic longitude. (3) We have detected [C I] in absorption against the broad emission lines toward the Galactic Center, providing evidence that much of the neutral carbon present in the galactic disk resides in very cold, translucent clouds. (4) We have detected [C I] emission from 8 high latitude clouds. These translucent clouds, exposed to modest UV fields, are the simplest laboratories to study the transition between molecular and atomic material. (5) We have surveyed 50 southern H II regions and detect [C I] toward every object.

17.08

**CH+ Production in J-type Shocks**

A. Peimbert (Princeton U.)

Numerical models of the chemistry of multi-fluid MHD shocks in diffuse molecular clouds have been calculated; 36 species were studied obtaining column densities and line profiles; special attention was given to CH+, CH and OH production. Particular attention has been given to J-type shocks, which have thus far been unexplored, for densities in the range of \(10^3 \text{ cm}^{-3} \leq n_H < 5 \times 10^4 \text{ cm}^{-3} \) with molecular hydrogen abundance of \(0.2 \leq H_2/N_H \leq 5\). Excitation of H_2 in the shock was studied with predicted column densities of rotationally excited levels. Implications for the production of interstellar CH+ will be discussed.

17.09

**A Search for the CO-H2 dinner in the Galaxy**

R.J. Allen, L. Loinard (STScI), A.R.W. McKellar (NRC of Canada), J. Lequeux (DEMIRM, Obs. de Paris)

We have used the 30m IRAM millimeter radio telescope to search for two low-lying rotational transitions of the CO-H2 dimer in the emission spectra of 3 Galactic sources and in the absorption spectrum of a low-latitude extragalactic continuum source. The transitions are the 111→000+ line at 109.21 GHz, and the 110→101- line at 90.84 GHz. The search targets were the TMC 1 L 134 dark clouds, the L 1157 bipolar outflow, and the compact radio continuum source 2013+370. The spectral search covered the frequency ranges from 90.58 - 91.10 GHz and from 108.95 - 109.46 GHz. Several known emission lines were found including HCN(12-11), HNC(10-9), OCS, SO, and HNC, but no other features were seen in the spectra. The rms noise was typically 5 mK per 1 MHz channel (∼3 km s⁻¹).

17.10

**Interstellar Hydrogen and Deuterium toward Alpha Aql, Alpha Cep, and Alpha Hyi**

W. Landsman (Hughes STX), T. Simon (U. of Hawaii)

We present high S/N GHRS G140M spectra of the nearby stars Altair (α Aql, V = 5.0 pc, I = 48, b = -9), α Cep (V = 15 pc, I = 101, b = 9), and α Hyi (V = 21 pc, I = 289, b = -54), which were obtained as part of a program to study the onset of chromospheric activity in late-type stars. These three stars are valuable probes of the local interstellar medium because they are of sufficiently early spectral type to have a large rotation (\( v \sin i > 150 \text{ km s}^{-1} \)), and yet are sufficiently cool to show Lyα in emission. The short line of sight toward Altair is particularly interesting because Ca II and UV absorption line studies have indicated the presence of three distinct interstellar components.

The GHRS spectrum of each star shows a broad Lyα emission cut by interstellar hydrogen and deuterium. We will fit the Lyα profiles to derive column densities and broadening parameters along the lines of sight.

17.11

**Abundance Determinations in Emission-Line Objects: The Revised Emission Line Chart**

J. B. Kingdon, R. E. Williams (Space Telescope Science Institute)

We present a revision of the Emission Line Chart (Williams, 1995), which displayed selected emission lines of different ions excited under nebular conditions in a convenient format. We have calculated an extensive grid of photoionization models, covering a wide range of hydrogen densities (\(n_H\)) and stellar temperatures (\(T_e\)). The results of this grid are used to identify those line ratios which are insensitive to conditions in the gas and which are therefore good for deriving abundances. These ratios are highlighted on the revised chart, where we indicate in which region of the \((n_H, T_e)\) plane they are most useful. We suggest that researchers give preference to utilizing these networks when deriving gas-phase abundances in emission-line objects.

17.12

**HST/GHRS Observations of 61 Cyg A and 40 Eri A**

B.E. Wood, J.L. Linsky (JILA, U. Colorado)

We present new HST/GHRS observations of interstellar absorption lines seen in UV spectra of 61 Cyg A (K5 V) and 40 Eri A (K1 V). These include the Lyman-α lines of H I and D I, and the Mg II h and k lines. We use these data to measure the properties of the local interstellar medium (LISM) and to