paths. The periodicities appear as diagonal stripes in dynamic spectra with characteristic separations of -0.1 to 1 M\(\text{s}^{-1}\) and -10 to 100 sec. We show that a power spectrum analysis of the dynamic spectra can lead to at least partial construction of an effective image for the pulsars during episodes of multiple imaging. We also derive constraints on the shape of the power spectrum of electron density fluctuations in the interstellar medium.

05.12
Predictions of Ultraviolet Polarization and the Constraints Imposed on Dust Parameters
Marc Balcells and John S. Mathis (Washburn Obs., U. Wis.-Madison)

An excellent empirical fit to the observed wavelength dependence of interstellar polarization has been given by Winkler et al. (A.J., 87, 695, 1962): 

\[ p(\lambda) = p_0 \exp\left[-K_{\lambda}^{\lambda_{\text{max}}} \right], \]

where \( K = 1.7 \) and \( \lambda_{\text{max}} \) is the wavelength of maximum polarization. Mathis (1986, Ap.J.) has shown that this law is well explained by assuming that each grain is a composite of small particles and that some of these small particles, possibly metallic Fe or magnetite, have very large magnetism (“superparamagnetism”, or SPM). Only those grains which contain one or more SPM particle are aligned in the galactic magnetic field. The optical model of SPM law is fitted very well with these assumptions, with one free parameter: \( a' \), the radius of the grain which has a probability of \( 1/e \) of containing at least one SPM particle. For the fitting a power-law distribution of sizes, \( n(a) \propto a^{-3} \), was used with \( a = 3.5 \), extending from the sizes \( a_{\text{min}} \) to \( a_{\text{max}} \).

The present work is in anticipation of the NASA Shuttle flight of ASTRO-1 with the Wisconsin Ultraviolet Photo-Polarimeter Experiment aboard. This device will measure \( p(\lambda) \) throughout the ultraviolet. The theory of Mathis (1986) outlined above is extended into the UV, taking account of the \( \lambda \)-dependence of the indices of refraction of silicates and the size dependence of the alignment. Predictions are made for \( p(\lambda) \) for 0.1 \( \mu \text{m} < \lambda < 3.5 \mu \text{m} \). The sensitivity of the predicted polarization to the grain distribution parameters, \( a, a_{\text{min}}, a_{\text{max}}, \) \( a' \) and \( a_{\text{min},a} \) are discussed; \( a' \) has the largest effect on the UV polarization which is consistent with the known variation of the extinction from object to object.

05.13
Ultraviolet Observations of Young Stars in the Chamaeleon 1 Association

In January 1985 the International Ultraviolet Explorer (IUE) satellite was used to obtain spectra of a sample of 10 pre-main sequence stars in the Chamaeleon 1 association. These stars ranged from 10.5 to 13.8 in visual magnitude and from G2 to M0 in spectral type. Low dispersion Mg II fluxes were obtained for all the stars and long (6\) hour) low dispersion, short wavelength (1216 \( \AA \)) spectra were obtained for five of the stars. The level of chromospheric activity shown by the star LMA 332-21 (KO, V=10.9) was found to be roughly an order of magnitude higher than that shown by the other stars. A significant variability was seen in the Mg II fluxes of five of the stars. The observed ultraviolet line fluxes will be presented and compared with previous observations made in other spectral regions. Properties of the outer atmospheric structure of LMA 332-21 will be discussed.

This work was supported by National Aeronautics and Space Administration grant NAG5-82 to the University of Colorado.

"Staff Member, Quantum Physics Division, National Bureau of Standards."

05.14
The M8 Hourglass Core: A region of Recent Star Formation?
C. E. Woodward, J. L. Pipher, H. L. Helfer, W. J. Forrest (Univ. of Rochester)

Moderate spatial resolution observations of the M8 Hourglass (Woodward et al. 1985, A.J. submitted), a compact HH region exhibiting non-standard reddening, strong 3-28\( \mu \text{m} \) band emission and peculiar optical and radio morphology, have suggested the possible presence of compact sources. We present here new, higher resolution spectroscopic observations (\( <2.5'\) pixel) in the \( [\text{SII}] \lambda 6716/6731 \) \( \lambda \) optical emission lines in order to identify areas of density enhancement, and 2.2\( \mu \text{m} \) images (\( <0.38'\) pixel) of the HH in order to search for compact embedded sources. The 2.2\( \mu \text{m} \) images reveal a previously undiscovered compact IR source (\( <1.4'\), \( >1' \)) (KS1) of Herschel 36 in the enveloping optical nebulosity, in addition to another source (\( >10''\), \( >1' \)) (KS2) of Herschel 36 in the main body of the HH. The [SII] observations indicate that the region is clumpy and non-homogeneous with a density knot along the line of sight to KS1. The strongest density peak is near the western 5 G\( \text{Hz} \) radio knot.

05.15
Extended Far-IR Emission Associated with Young Star Molecular Outflow
S. Strom, B. Senn, T. Jarrett, S. Edwards, K. Strom (Five College Astronomy Department), C. Belcher (Cal Tech)

Co-added IRAS survey data have been used to examine the infrared properties of molecular outflows associated with young stars. We find extended IR emission, apparently coincident with the L1551 IRS 5, T Tau, R Mon, and B335 CO molecular flows and possibly with R Cr A and Haro 6-10. In this contribution, we present a preliminary analysis of the co-IR properties of the L1551/IRS 5 region. Below, we present a contour map of the 60\( \mu \text{m} \) emission associated with the outflow; these contours generally follow the outer contours of the flow mapped by CO.

The summed 60\( \mu \text{m} \) and 100\( \mu \text{m} \) luminosity of the extended emission associated with the flow is \( 2 \, L_{\odot} \). From the average 60\( \mu \text{m}/100\( \mu \text{m} \) color temperature characteristic of the region (20-25\( K \)) we estimate a total luminosity of \( ~4 \, L_{\odot} \) for the extended emission. By comparison, the lower limit bolometric luminosity of the source powering the outflow (IRAS 5) is \( 30 \, L_{\odot} \). The mechanical luminosity from the IRS 5 wind (\( M = 10^{-7} \, \text{M}_{\odot}, \, v = 200 \, \text{km s}^{-1} \)) is \( ~10 \, L_{\odot} \). The far-IR emission can thus be powered either by collisional heating of grains (in shock-excited region at the outflow/cloud boundary) or by radiation emanating from IRS 5.

05.16
The Relationship Between Disks, Mass Outflows and Global Cloud Structures from Young Stellar Objects

I believe these observations may be due to interstellar processes that are responsible for the creation and evolution of the interstellar medium. For example, the observed ultraviolet line fluxes will be presented and compared with previous observations made in other spectral regions. Properties of the outer atmospheric structure of LMA 332-21 will be discussed.