ABSTRACTS

SW Peg, R Pac, RR Sgr, and TT Sgr. Nine other stars possibly show the presence of Tc I.

In the remaining 61 stars we find little evidence for the presence of Tc I lines. A large fraction of these 61 stars are not Mira variables, and many have a low amplitude of variation, Ten are supergiants, which we have never found to show the presence of technetium unless they are also NS stars.

| TABLE 1. STARS DEFINITELY SHOWING Tc I LINES |
| W Get | M-351 | 66.3-89, 2e |
| R Col | M-328 | N3=4e |
| T Gem | M288 | S1.5, 5e-89, 5e |
| V Gem | M-275 | N46(3)-M5e |
| RR Hya | M-343 | N3.0e-M0e |
| RX Sgr | M-334 | M5e |

Lithium abundances in F stars.

Suchitra Balachandran (U. Texas, Austin).

The causes of lithium depletion in main sequence stars are being studied by comparing lithium abundances in rapidly and slowly rotating F stars in the Hertzsprung gap. We have observed over 200 F stars with a range in veq between 50 and 100 km/s. using the 2.1m telescope and the coude spectrograph at McDonald observatory. The star sample was obtained from Eggen (P.A.S.P., 85, 542, 1973). The Li resonance doublet at 6707.8 Å yields the Li abundance. The rotational velocity, veq, is obtained by measuring Fe I lines in the same spectral region. The ages of our sample stars are estimated using isochrones. The object of the program is to examine if differential rotation between the core and the outer layers of a star, which causes turbulence, can induce mixing and Li depletion.

The Surface Magnetic Fields of dM and dMe Stars

S. H. Saar, J. L. Linsky (JILA, Univ. of Colo. & NBS), M. S. Giampa (NSO, NOAO).

We present the first results of a survey of photospheric magnetic fields on M dwarfs. High resolution (R = 40,000), low noise (1-5%) infrared spectra of 8 M stars were obtained with the NOAO AM Fourier Transform Spectrometer. For one star, AD Leo, spectra were taken on two nights with simultaneous IUE observations of ultraviolet emission lines. Infrared line profiles have been analyzed using improved magnetic modeling techniques (Saar, Linsky, and Beckers, 1986), yielding the fraction of the stellar surface covered by magnetically active regions (f) and the mean field strength (B) in these regions. The preliminary results are: (a) most M stars show little magnetic activity (B ≤ 500 G and/or f ≤ 0.05) and (b) for stars with measurable fields, magnetic field strengths increase toward later spectral types, and larger filling factors occur on stars with rapid rotation and increased levels of surface activity such as Ha emission and flaring. The implications of these results for models of stellar activity and dynamics, and for the formation of Ha in M stars is discussed.

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Session 5: H II Regions

10:45–12:15 (Benton Auditorium)

Low Mass Pre-Main Sequence Stars: The Infrared Emission From Circumstellar Dust


Models of circumstellar dust shells around low mass, pre-main sequence stars have been constructed that accurately fit the observed near infrared flux distributions. The infrared spectra of IRS and IRS2 in the Serpens molecular cloud have been calculated from 1 um to ~100 um. Fits to the observed near infrared fluxes were obtained by adjusting the central protostar mass, shell optical depth, inner shell radius, and extinction by the foreground molecular cloud. The models assume spherical symmetric circumstellar dust shells illuminated by protostars of mass ≤ 2.5 Msun. The observed feature at 3.07 um is also fit by a column of ice (H2O:NH3) coated grains. The models indicate that the spectra of the dust shells alone peak at 2 um; maxima at wavelengths longer than this are not indicated. An r^{-2} density gradient produces an emergent spectrum which declines more steeply at λ > 5 um than that of an r^{-3/2} density gradient; unfortunately, in the absence of observations at wavelengths longer than 5 um, we cannot distinguish between r^{-2} and an r^{-3/2} density distribution in the shell.

Grain temperatures decrease with radial distance from the protostar from ~2000 K at the shell's inner edge to ~100 K at the outer boundary. At a single radial distance grain temperatures can vary with grain size and composition by as much as a factor of 2.

It is shown that the empirical technique of Churchwell and Koonnef (1986, Ap. J., 300, 729) for estimating the mean temperature, radius, and luminosity of the dust shell using H and K fluxes is correct to a factor of three or better. This technique provides reasonably accurate estimates because the dust temperature gradient in the inner shell is so steep that the near infrared emission is effectively produced only in a thin shell near the inner boundary.

5.02 Properties of the IR emission of interstellar dust surrounding ionizing stars in the Rho Ophiuchi region


IRAS Sky-Flux maps have been used to study the properties of interstellar dust in the region of the Rho Ophiuchi molecular cloud. Except for a strong narrow central 12μm peak, it is found that the 12μm to 100μm intensity ratio is significantly lower in areas coincident with the HII regions formed by ionizing stars, when compared to the value observed in the diffuse interstellar medium, the surroundings of the newly formed star HD 147889, and the east filaments of the cloud. A similar effect has been observed in the large scale galactic IR distribution. Assuming that the IRAS 12μm band mostly reflects the emission by very small particles, possibly polycyclic aromatic hydrocarbons (PAH) radiating in the 8.8μm and 11.3μm unidentified IR bands, it is concluded that those very small particles do not survive in HII regions.

5.03 Hydrodynamical Processes in the Draco Molecular Cloud?

S. F. Odenwald, L. J. Rickett (NRL/SFA), L. Blitz (U. of Maryland).

Theoretical models of the collisions between molecular clouds falling onto the galactic plane and the ambient disk ISM (Tenorio-Tagle, 1981) show that some of the encounters can lead to the formation of filaments, loops and star-forming activity.

The Draco Molecular Cloud is a high latitude cloud at b = 36° originally discovered by Kaler et al. (1982). Evidence for the interaction of this cloud with the galactic disk has been obtained by Mebold et al. (1985) through an analysis of the SAS-3 and NEAR-1 X-ray observations.