

1979 to February 1980. Stars were observed to obtain the extinction coefficients and the transformation equations to the standard U-BV system and their results are presented.

A SURFACE PHOTOMETRY OF NGC 4258

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Surface brightness profiles of nearby galaxy NGC 4258(M 106) are obtained at V and B wavelengths. The eastwest profiles appear to be slightly asymmetric, especially in color V. Central part of the galaxy is slightly blue than the outer part, while the opposite trend is common for most galaxies. Its implications will be discussed.

SIUMLTANEOUS OBSERVATIONS OF HIGH RESOLUTION SPECTRA OVER A SUNSPOT UMBRA

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Simultaneous observations of high resolution spectra of Ca II H, K, $\lambda 8542$ and $\lambda 8498$ have been made over a sunspot umbra(SPO 5007) by means of SPO's HIRKHAD program with the Echelle spectrograph at the vacuum solar tower telescope. The observed spectra have been scanned by SPO's fast microphotometer and reduced for theoretical interpretations. The reduced profiles were sampled over a specific region, which is thought to be coolest over the spot. Theoretical interpretations of these spectra based on the non-LTE line formation theory will be presented.

MOLECULAR FORMATION IN SUNSPOTS

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An extensive investigation has been made on molecular formations under sunspot and the photospheric conditions by calculating equilibrium molecular number densities as a function of optical depth in selected models of umbra, penumbra and the photosphere.

Strong enhancement of metallic oxides has been found in the umbral regions, while hydrides are enhanced to a lesser degree. The carbon-containing diatomic molecules such as CH, C₂ and CN are enhanced greater in the penumbra than in the photosphere or umbrae. Since any departure from these

trends would suggest inhomogeneities in the penumbral region, simultaneous observations of spectra of selected lines of CH, C₂ and CN as well as TiO and MgH with the slit extending across umbral and penumbral regions appear to be highly desirable to explore the penumbral inhomogeneities.

EFFECT OF MASS LOSS ON THE EVOLUTIONARY TRACKS OF STEIN'S PRE-MAIN SEQUENCE STARS

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The evolutionary tracks of pre-main sequence stars in quasihydrostatic equilibrium have been computed by using Stein's linear model, which are losing mass at the rate of $dM/dt = -K(RL/GM)$. It is found that the effect

of mass loss on the evolutionary tracks shows up sharply as the mass loss parameter K becomes greater than 10^{-2} . Recent Hutching's observations indicate that the appropriate value of K should be smaller than 10^{-3} .

EFFECTS OF METAL ABUNDANCES ON THE ELECTRON TEMPERATURE IN H II REGIONS

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In order to assess the importance of trace elements as cooling agents in H II regions, we have considered thermal and photoionization equilibria under various conditions. The differences in electron temperature due to central star and density are shown to be

small in comparison to those due to changes in heavy element abundances. It is concluded that the metal abundance is the most important factor in the determination of electron temperatures in H II regions.