POSTER PAPERS - SESSIONS 1 and 2.

Chairman : A.J. Willis.

1. T.R.MANLEY: A Stellar Content Study of NGC 2403 with the Automated Plate Scanner.

2. V.NIEMELA: Spectroscopic Binaries in the LMC.

3. E. ZSOLDOS: The Hypergiant Variable HR 8752=HD217476.

4. J.SMOLINSKI, J.L.CLIMENHAGA and J.M.FLETCHER: Activity in the Envelope of the G-type Hypergiant HD 217476.

5. D.J.STICKLAND: IRAS Observations of the Cool Galactic Hypergiants.

6. R.K.PRINJA and I. HOWARTH: Is Rotation Important?

7. D.H.MORGAN, K.NANDY and G.I.THOMPSON: The Absorption Feature at 1920 A in the Spectra of Early-type Supergiants in the SMC.

8. L.MANTEGAZZA: The Light Variations of the Red Supergiant Mu Cephei.

9. G.R.GRIEVE and B.F.MADORE: Variability of Magellanic Cloud Supergiants.

10. M.KONTIZAS and E.KONTIZAS: Star Formation Rate of Star Clusters in the SMC and their Adjoining Fields.

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11. J.A.GRAHAM and R.M.HUMPHREYS:
Red Supergiants in NGC 300.

12. L.GREGGIO: Simulations of the Brightest Stars in Galaxies as Distance Indicators.

13. C. de JAGER, H.NIEUWENHUIJZEN and K.A. VAN DER HUCHT:
The Dependence of the Stellar Rate of Mass Loss on Effective Temperature and Luminosity.

14. B.BOHANNAN, D.C.ABBOTT,S.A. VOELS and D.G.HUMMER:
Steps to a New Calibration of the Spectral Type-Effective Temperature Relationship for Early-type Stars.

15. E.CASTELLI, C.MOROSSI and R.STALIO:
Photospheric and "Chromospheric" CIV lines in B-Main-Sequence Stars.

16. R.POLIDAN and R.STALIO:
Voyager Observations of Hot Luminous Stars.

17. E.NASI: Synthetic HR Diagrams for Luminous Stars. A Test of Stellar Evolution Theory.

18. D.J.McCONNELL, R.F. WING and F. COSTA:
A Low Dispersion Near Infrared Survey for Galactic M-Supergiants.

A STELLAR CONTENT STUDY OF NGC 2403 WITH THE AUTOMATED PLATE SCANNER

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In this poster we illustrate how the Minnesota Automated Plate Scanner (APS) is being used to study the luminous stellar content of NGC 2403. Presented are a brief description of the APS, examples of photometric calibration, separation of stellar and non-stellar images, and a preliminary color-magnitude diagram. The eventual goal is to study the evolution of massive stars via color-magnitude diagrams, luminosity functions and star formation rates.

The APS is a very high speed measuring machine. Two plates are mounted on a moving table with accurately calibrated lead screws controlled by an M6809 microprocessor. A laser beam is passed through a rotating octagonal prism, is then split and focussed to a 10 micron spot on each of the two plates as well as on a reticle used to determine position. The light passing through the plates is detected by semiconductor photodetectors. A PDP 11/60 computer records the positions of the plates where the density crosses either of two (soon to be four) threshold levels. The data are then sorted by the PDP 11/60 into images and parameterized with ellipses. The ellipse parameters are the X and Y positions of the center, the diameter, ellipticity and orientation of the ellipse, and FUZ, which is a measure of the goodness of fit of the ellipse to the transit endpoints. A catalog of the ellipse parameters is made for all of the images on each plage. Plate pairs can be matched to produce a catalog of images that are on both plates. All programming is done in FORTH, and results are displayed on a Grinnell image processor.

The scanning is done in strips 12mm wide at rates of 1.5, 3 or 6 mm/sec. Due to its very high speed, the APS is best at problems where a large number of images need to be processed.

The scans of the plates are calibrated photometrically with photoelectric and CCD observations of nearby field stars in the standard U, B, V and R magnitudes. To get more accurate photometric calibrations, color equations were determined to convert the CCD photometric system to the plate/filter system. This was done by taking a series of spectra

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of main sequence stars from B0 to M5, multiplying by the published spectral response curves for the plate/filter or CCD/filter combination, and integrating over wavelengths to get a relative response in a passband. For example, the color term for V is the slope of a plot of $V_{pg}-V_{CCD}$ as function of $(B-V)_{CCD}$. Once this is done the image diameter-magnitude calibrated can be well determined for each plate/filter combination.

Two of the ellipse parameters are used to separate stellar from non-stellar images, ellipticity and FUZ. Plots of ellipticity vs. diameter and FUZ vs. diameter can be used to separate stellar and non-stellar images.

Preliminary plots of V vs. V-R for two areas of approximately the same size, one inside NGC 2403 and one of a nearby star field are discussed. Only images classified as stellar from FUZ and ellipticity criteria are considered. The number of stars is about the same in both plots, but there are many more faint stars on the galaxy plot, which reflects the dominant contribution from stars in the galaxy. Adopting an apparent distance modulus of $(m-M)_V = 27.8$, we are seeing stars in the galaxy down to an absolute magnitude of about -7 on the V vs. V-R diagram.