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o And: POLARIZATION OBSERVATIONS OF 1982 APRIL EVINCE THE RECENT SHELL EPISODE

Wide-band linear polarization observations of the recurrent shell star o Andromedae (HD 217675, B6pe) have recently been carried out. This study was prompted by photometric and spectroscopic indications of a recent shell episode in this star [vide Bossi et al. (1982) and Baade et al. (1982)]. Another motivating factor was that direct comparison could be made with a series of measurements carried out by the author over the epoch 1978-1979.

All the observations were made at the Cassegrain focus of the 61 cm telescope at Columbia University's Harriman Observatory. Essentially the same wide-band (B) filter, polarimeter, ancillary equipment and observing procedures were used as in the previous survey of this star carried out by Hayes and Terrance (1980). The complete journal of the seven polarization measurements made in 1982 April appear in Table I, with P denoting the amount (expressed as a percentage), and θ denoting the direction (expressed in the equatorial coordinate system). Each observation had a Poisson photon-count standard deviation of 0.02% for P as well as for the two Stokes parameters, Q and U. The standard deviation of θ is given by $28\overset{\circ}{.}7\ (\sigma_p/P)$.

The means of the observations being reported here are: $\overline{P} = 0.40\%$ and $\overline{\theta} = 92.6°$. Hayes and Terrance (ibid) reported means of $\overline{P} = 0.18\%$ and $\overline{\theta} = 81.3°$ from thirty-two observations carried out over 1978 December - 1979 September. (The latter observations were shown to be consistent with the expected interstellar contribution.) Comparison of these means offers convincing evidence that a statistically significant polarization change occurred between 1979 September and 1982 April.

A one-sided χ-test was carried out to quantitatively gauge whether the observations had a variability in excess of that expected from photon counts. [The interested reader may consult Hayes and Terrance (ibid) for a description of this statistical test.] This test showed variability at the 93%

Table I

Journal of Polarization Amount and Position Angle of o Andromedae

Date (UT)	P (%)	θ (deg.)
1982 April 19	0.42	93.3
1982 April 22	0.37	92.3
1982 April 23	0.41	90.6
1982 April 24	0.42	92.3
1982 April 25	0.38	96.4
1982 April 29	0.43	91.6
1982 April 30	0.37	92.0

confidence level, which is considered to be a marginal indicator of variability. The 1978-1979 measurements showed statistically insignificant variability - as would be expected if there was an overwhelming interstellar contribution. Omicron Andromedae will continue to be observed. An impetus to continued monitoring are the fragmentary reports of short-term (approximately 0.8 and 1.6 days) quasi-periodic spectroscopic and photometric variations in this star. Efforts will be made to determine whether the polarization displays any such short-term variations.

The results of this linear polarization survey of o And may be summarized as follows. The wide-band (B) filter measurements being reported here differ significantly from those obtained in epoch 1978-1979. The consolidated observations offer convincing evidence for this star's recent shell episode. At present there is only marginal evidence that the 1982 observations have statistically significant variations.

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References:

Baade, D., Pollok, H., Schumann, J., and Duerbeck ,H. 1982, Inf. Bull. Variable Stars, No. 2125.

Bossi, M., Guerrero, G., Mantegazza, L., and Scardia, M. 1982, Inf. Bull. Variable Stars, No. 2082.

Hayes, D. and Terrance, T. 1980, Pub. A.S.P. 92, 89.