

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 1984

Konkoly Observatory
Budapest
1981 June 30
HU ISSN 0374-0676

B-FILTER LINEAR POLARIZATION MEASUREMENTS OF μ Cep
IN THE AUTUMN OF 1980

Arsenijevic et al. (1980) have recently reported on four V spectral region linear polarization measurements of the semi-regular variable star μ Cep (M2 Ia, SRc) which were carried out in 1980 August and September. This bulletin will report on seven wide-band (B) filter linear polarization measurements of μ Cep which were made in a contiguous epoch. All the observations being reported here were carried out at the Cassegrain focus of the 61 cm telescope at Columbia University's Harriman Observatory. The same filter, and essentially the same polarimeter, ancillary equipment and observing procedures were used as in previous surveys of this type carried out by the author (Hayes 1980a, 1980b). The interested reader may consult these references for further details regarding instrumentation and observing procedures.

The polarization observations are reported 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 0.025% for P as well as for the two Stokes parameters $Q = P \cos 2\theta$ and $U = P \sin 2\theta$. The standard deviation of θ is given by $28.7 (\sigma_p/P)$. Observations were only carried out when the moonlight background was negligible.

Perusal of the data suggests that the polarization was relatively quiescent over most of the observing

Table I

Polarization Degree and Position Angle of μ Cep

Date (UT)	P (%)	θ (deg.)
1980 Oct. 01	4.16	41.6
1980 Oct. 07	4.18	41.2
1980 Oct. 10	4.21	41.3
1980 Nov. 03	4.19	41.7
1980 Nov. 05	4.17	41.4
1980 Nov. 13	4.12	42.1
1980 Dec. 04	4.05	39.7

interval. But the very last observation (1980 Dec. 04) suggests that the polarization had commenced to decrease. (Unfortunately, the paucity of observations in 1980 December precludes making any more definitive statement.) A series of formal statistical tests [consult Hayes (1980a) for details] were carried out to gauge the variability of the consolidated distribution of Q and U data points. A test of the first five observations showed variability at only the 57% confidence level, which is considered to be statistically insignificant. A test of all seven observations showed variability at the 99% confidence level, a statistically significant result. The quiescence of the first five observations (1980 Oct. 01 - Nov. 05) agrees with the invariant polarization over about a month's interval reported by Arsenijevic et al. (ibid). The variability detected over the complete observing interval is in agreement with Coyne and Kruszewski's (1968) observation that large changes in polarization occur over the course of a few months in this star. Arsenijevic et al. (ibid) reported a mean \bar{P} of 3.8% and a mean $\bar{\theta}$ of 35°, and noted that the polarization was larger than any

previously reported in the English-language literature. The B-filter polarizations being reported here ($\bar{P} = 4.15\%$, with a $\bar{\theta}$ of 41.3°) are also quite large. Differences in the amount and direction of polarization in the B- and V-region are not unexpected in late-type stars, and have previously been reported in μ Cep by Coyne and Kruszewski (ibid).

The results of this survey may be summarized as follows. The wide-band (B) filter linear polarization measurements being reported here both concur with, and complement and extend the V spectral measurements of Arsenijevic et al. (ibid). Both series of measurements showed that in a historical context the polarization was remarkably strong. The significance and implications of such large polarization values have already been pointed out by Arsenijevic et al. (ibid). The data being presented here has been shown to be variable over the course of the complete observing interval (some 2 months). The later stages of this survey suggest that the polarization has started to decrease. This star will continue to be monitored as part of an ongoing effort to determine the precise morphology of polarization variations in selected late-type stars.

DANIEL P. HAYES

Astronomy Department
Columbia University
New York, New York 10027
U.S.A.

References:

- Arsenijevic, J., Kubicela, A., and Vince, I. 1980, *Inf. Bull. Variable Stars*, No. 1859.
Coyne, G. and Kruszewski, A. 1968, *A. J.* 73, 20.
Hayes, D. 1980a, *Pub. A.S.P.*, 92, 661.
_____ 1980b, *Ap. J. (Letters)*, 241, L165.