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PHOTOMETRIC STUDY OF IO ANDROMEDAE

The cataclysmic variable IO Andromedae (= S 10785) was discovered in 1975 by Meinunger (1975) and classified as an irregular variable of Ia type. In 1979 Meinunger (1980) suspected that it belonged to AM Her-type objects. Its spectrum is typical of cataclysmic variables, but until now there have been no data about its spectral changes and rapid variability.

IO Andromedae was inspected on nearly 630 photographic plates (mainly ORWO ZU-2) centred on M 31 which were exposed by Prof. A.S. Sharov and his collaborators at the AZT-5 telescope at the Southern Station of Sternberg State Astronomical Institute. The brightness of comparison stars was obtained by fitting them to the B-magnitudes of standard stars published by Baade and Swope (1963) (region No. 4) by using the iris-photometer of Sternberg Astronomical Institute. The finding chart is shown in Figure 1, the adopted brightness of the comparison stars is given in Table I, where B are our results, m_M - Meinunger's (1975). The difference between the magnitude scales is mainly due to the error of zero-point.

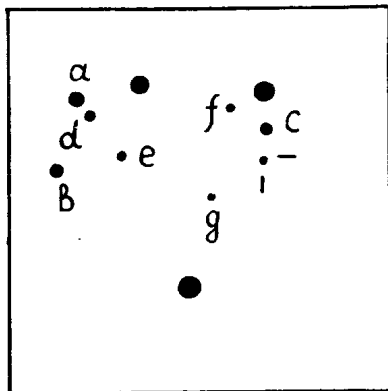


Figure 1

The finding chart for IO Andromedae

Table I
Comparison stars for IO Andromedae

*	B	m_M	*	B	m_M
a	15.34		e	16.58	16.8
b	15.96		f	17.31	
c	16.01	16.3	g	17.60	17.3
d	16.14				

Figure 2 shows the light curve of mean season brightness. Unlike AM Herculis (Hudec and Meinunger, 1976) and MV Lyrae (Wenzel, 1980 and Andronov and Shugarov, 1982), the active and inactive states are much less pronounced. The mean season brightness is variable with an amplitude of about 0.6^m , never more than 1.4^m . A five-year cycle of luminosity changes is possible although the system was bright in 1975.

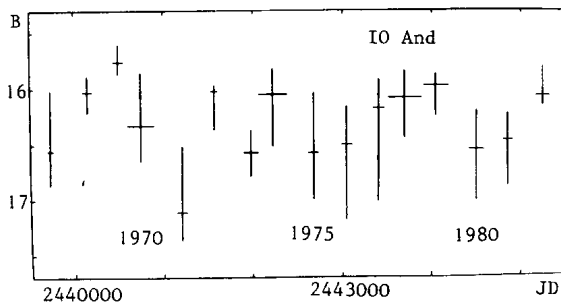


Figure 2

Mean season brightness of IO And. The vertical line corresponds to the interval of brightness changes. The horizontal line marks the mean value.

The seasonal light curves are shown in Figure 3. The interval of brightness changes in our data ($15.6^m - 17.5^m$) is somewhat greater than in Meinunger's (1975) data (with his comparison stars): $16.2^m - 17.1^m$. The mean brightness from all observations is 16.32^m with $\sigma = 0.37^m$. The histogram is asymmetric with bright end decrease being more steep. If $P(B_0)$ is the probability of $B \leq B_0$, then for $P(B_0)$ equal to $1/4$, $1/2$, $3/4$ one may obtain the values 15.99^m , 16.23^m and 16.49^m for B_0 .

Fluctuations with an amplitude of 0.4^m and a time-scale of 0.5 hour are present. More rapid variability is possible. Night-to-night changes have similar amplitude, and there is a tendency for it to increase up to 0.5^m in intermediate state although in active and inactive states it reduces to 0.3^m . These changes are not periodic, the observed time intervals between two successive minima are from 4 to 16 days. Fluctuations may mask orbital changes.

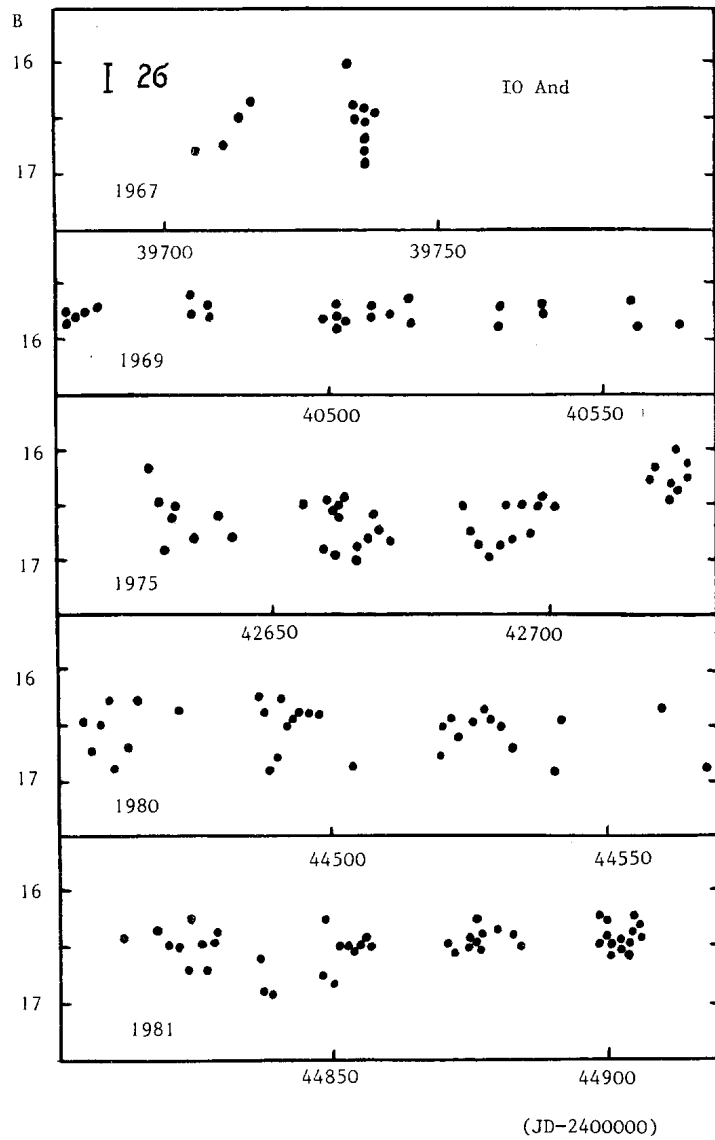


Figure 3

Some seasonal light curves of IO Andromedae

In the years 1968/69, 1972/73, 1978/79 and 1982, the amplitude was minimal, night-to-night changes were masked by rapid fluctuations and observational errors. These "standstills" lasting several months are common for all season-

al light curves and do not depend on their amplitude and system luminosity.

The star was very bright in the U-band. On 14 October 1974 its brightness on one plate was $13.4+0.5^m$. In the B-band the brightness was slightly variable around 16.0^m . In the V-band the system was faint. On 13 October 1974 it was as bright as comparison star c.

Photometrically, the system looks like V 794 Aquilae which was also classified as a polar by Meinunger (1979). Flares in IO And are slightly narrower than discovered by Petrochenko and Shugarov (1982) in V 794 Aql ($\sim 22^d$) and have significantly smaller amplitude (compared with 2^m in V 794 Aql). Perhaps these two systems are novalike variables, but not polars.

One may note an analogy with the active state of MV Lyrae. If we have not detected decreases in brightness greater than 1.5^m before, it does not mean that they might not occur. As we know, MV Lyrae was in active and intermediate states from the beginning of the century and it became fainter (by 6^m) in 1979 - being in this state for about 3 years (Andronov and Shugarov, 1982).

Photometric, polarimetric, X-ray and spectral observational sequences are needed to make the classification more plausible.

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