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THE FIRST GROUND-BASED PHOTOMETRIC OBSERVATIONS OF V401 LACERTAE

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The variability of V401 Lac (HIP 109283 = BD +48°3621, $\alpha_{2000} = 22^{h}08^{m}21\overset{s}{.}25$, $\delta_{2000} = +49°13'15\overset{''}{.}6$) was first discovered by HIPPARCOS (ESA, 1997). The photometric observations of the system by HIPPARCOS show an Algol type light curve with an amplitude of $0\overset{m}{.}230$ ranging from $7\overset{m}{.}932$ to $8\overset{m}{.}162$ in V. The mean orbital period derived by HIPPARCOS from the best light curve fit is $1\overset{d}{.}95010$ and the epoch is given as JD 2448501.7900 (ESA, 1997). The spectral type of the system is given as A0.

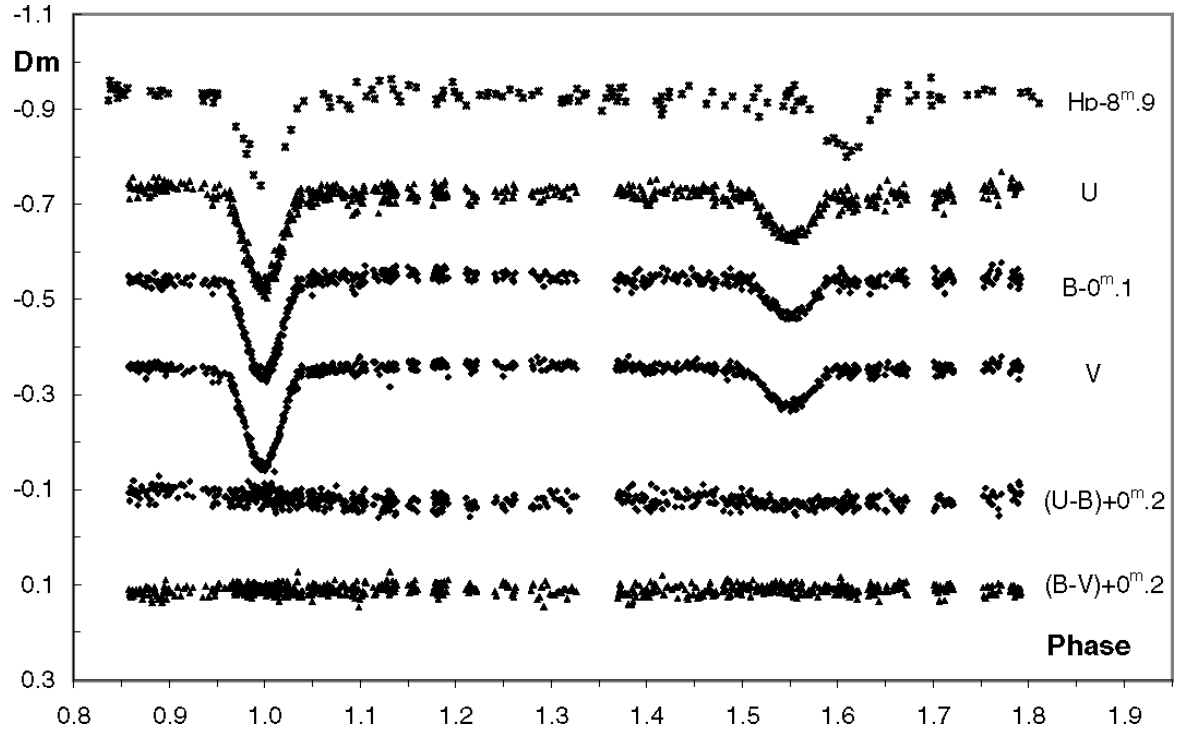

Figure 1. The light and color curves of V401 Lac

The first ground-based photometric observations of V401 Lac were made on 17 nights during 2000 and 2001 observing seasons with a 40-cm Cassegrain telescope at the TÜBİTAK (Scientific and Technical Research Council of Turkey) National Observatory. The

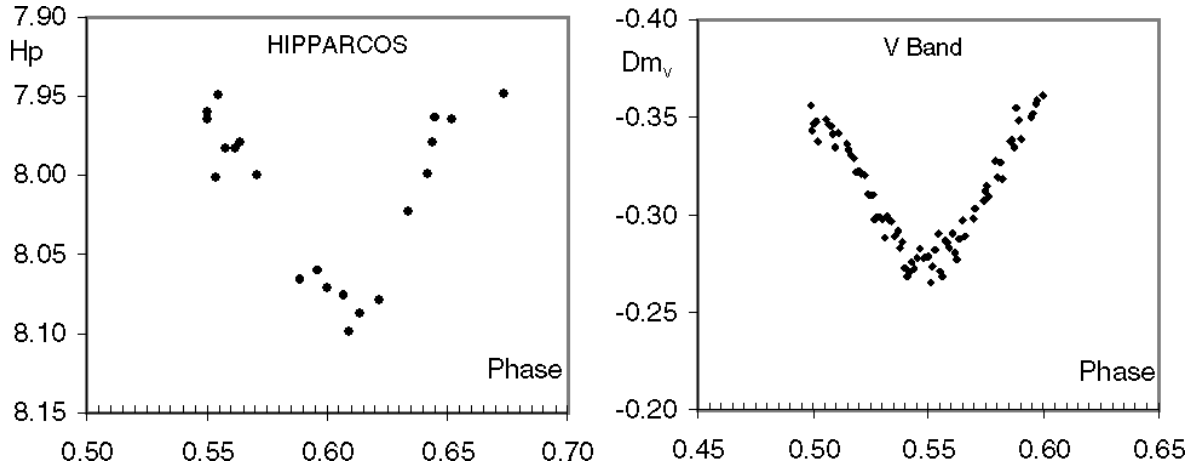

Figure 2. Expanded view around the secondary eclipses

observations were secured by using a single channel OPTEC SSP-5A photometer head which contains a side on R-4457 (PMT) Hamamatsu photomultiplier and UBV filter set close to the standard system. Differential observations, in the sense variable minus comparison, were corrected for the atmospheric extinction and the light time effect. The comparison star is BD +48°3613 (HIP 109026), and the check stars are BD +44°4041 (HIP 209932). The standard errors of our observations are about $0\overset{m}{.}014$, $0\overset{m}{.}011$, and $0\overset{m}{.}008$ in U, B and V filters, respectively.

The light and color curves were plotted in Figure 1 together with the HIPPARCOS light curve. New light curves show that the depths of the eclipses are remarkably different. The estimated values are $0\overset{m}{.}216$ and $0\overset{m}{.}089$ for the primary and the secondary minima respectively. The enlarged eclipse light curve reveal that the duration of the primary and secondary eclipses are about 3.76 and 4.28 hours. It means that the primary eclipse occurs relatively closer to periastron. The position of secondary minimum shifts towards decreasing phases (Fig. 2). About 0.06 phase shift of the secondary minimum in nine years between HIPPARCOS and our observations gives the first estimate of about 150 yr for the apsidal motion period of V401 Lac. The system seems to be a good candidate of eclipsing binary with apsidal motion. Therefore further observations of the system are needed in finding the apsidal motion parameters.

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Reference:

ESA, 1997, The Hipparcos & Tycho Catalogues, SP–1200