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Detection of a faint variable with $\Delta m > 4^m.5$ in Andromeda

As a by-program in the course of studies on the galactic structure, we have started a search for new variable stars on Palomar Observatory Sky Survey (POSS) prints. The search is done by comparison of overlapping regions of POSS fields (using positive and negative transparent copies) around $\alpha \approx 00^h$, where the largest overlap occurs. Here we present our most obvious candidate.

The star was discovered on POSS O and E839, but is absent on O and E368. Its coordinates are $\alpha = 23^h47^m47^s$, $\delta = +46°42'40''$; $\pm 0.'1$ (1950). In Figure 1, finding charts are given.

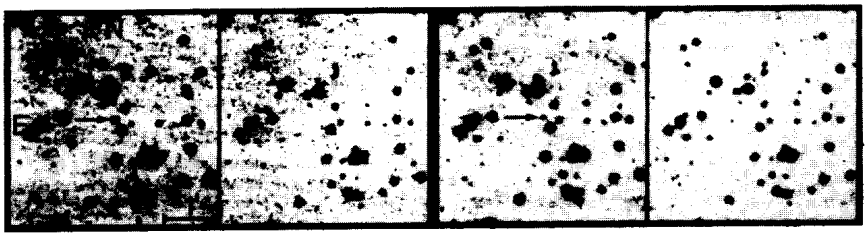

Figure 1: Reproductions from blue-sensitive (O) and red-sensitive (E) POSS prints. From left to right: O839, O368, E839, and E368.

To estimate the brightness of the variable, we measured the size of the star image and used the mean magnitude - diameter relations published by King and Raff (1977) and Humphreys et al. (1991). The weighted means are:

$$m_b = 17.2,\ m_r = 17.6,$$

with an error of approximately $\pm 0^m.5$, respectively.

On several plates taken with the Schmidt telescopes of the Sonneberg Observatory [m_b(lim) $\approx$ 18] and the Karl Schwarzschild Observatory [m_b(lim) $\approx 20^m$], in the SE corner of the very recently delivered (1st shipment) POSS II transparency B240 [m_b(lim) $\approx$ 22], as well as on a CCD V frame [m_V(lim) $\approx$ 22] the region in question is contained, but no trace of the star is visible.

The variable thus only appears on the plate pair E and O839. These exposures were taken on Oct. 1/2 1953 (45min E plate, break of 6min, followed by the 12min O plate). A comparison of the star images in O and E shows,

by far more convincing than the rather inaccurate brightness data from above, the blueness of the object. Stars with such an extremely blue colour can at best be found among central stars ($T_{eff} \approx 10^5$K) of planetary nebulae. A variable of this amplitude is, however, not known among central stars; besides, there is no nebula visible on the POSS.

As a consequence, it is plausible that the star underwent a brightness change during the exposure of the plate pair, with a rapid increase in brightness during < 1 hour.

By taking the large amplitude ($\Delta m > 4\overset{m}{.}5$) into account, it is tempting to speculate whether the variable is an eruptive star of some kind. In this connexion it might be of interest that there is no sign of any dark cloud or star forming region in or near the area on the POSS and that there is no IRAS point source at the position of the star. The variable is located just outside the error box of the X-ray source 1H2353+471 (Wood et al. 1984).

It might be rewarding to obtain a very deep exposure (CCDs) in order to gain more information on this object.

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R. WEINBERGER
Institut für Astronomie
Technikerstrasse 25
A-6020 Innsbruck, AUSTRIA

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