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

NUMBER 773

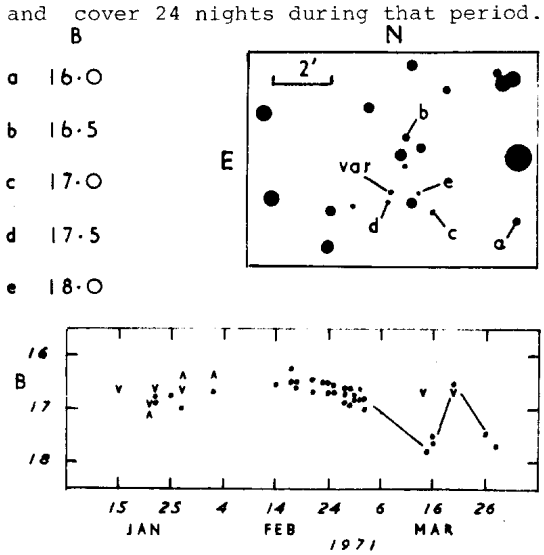
Konkoly Observatory
Budapest
1973 March 14

A NEW VARIABLE STAR IN THE LMC WITHIN THE ERROR BOX OF THE X-RAY SOURCE LMC X1

In identifying the optical counterparts of discrete X-ray sources a knowledge of all variable stars within the error box is of interest. Although several criteria such as synchronous variation at X-ray and optical wavelengths may eventually be applied to all possible candidates, pecular photometric (flare-like) or colorimetric properties (ultraviolet excess) have previously been considered. The error box of LMC X1 (2U 0540-69), an area of about 80 square minutes of arc centred at:

$5^h40^m58^s$ $-69^o48'00"$ Equinox 1950,

as given in the Uhuru Catalogue (Giacconi et al. 1972), has been searched for variables on 32/36-inch Baker-Schmidt plates. The plate-filter combination used matched the standard B band (103a-O+ +BG12 + GG18), and the exposure time (30 mins) reached a limiting magnitude of about 18.5. A total of 42 plates taken by Dr.T. W. Rackham at the Boyden Observatory between 15 January and 28 March 1971 were available from the Armagh Observatory collection, and cover 24 nights during that period.



The error box contains the irregular variables HV 2764 and 2760, as well as a small region of emission nebulosity of 30 Doradus. Identification with 30 Dor has been discounted by Leong et al. (1971). The newly discovered variable lies about 6 mins of arc south of the error box, i.e. just within the error region of 90 percent confidence, at the approximate position:

Equatorial coordinates $5^h41^m.2$ $-69^\circ54'$ (1950)

Harvard coordinates X = 17030 Y = 7060

A finding chart together with the comparison stars used is given below. The sequence is very approximate and was extrapolated using the photoelectric magnitudes of Walker and Morris (1968) and the estimated ADH plate limit. The brightest star in the field of the chart has a B magnitude of about 11.1 but appears to be anonymous. A light curve is also shown in which the star exhibits a range of 1.5 mags from 16.2 to 17.7, appearing usually bright. The variable was faint on the nights 15-16 March and 26-28 March 1971.

Further photometric and particularly colorimetric investigations might be profitable. The author is indebted to Dr.C.J. Butler of Dunsink Observatory for drawing his attention to this X-ray source, although he points out that variation of the source itsefl is still uncertain.

Armagh Observatory
7 March 1973

A. D. ANDREWS

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