

Research Note

Secondary Fluctuations in the Light Curve of ϵ Aur

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Summary. Colour dependent fluctuations in the light curve of ϵ Aur was found outside the eclipse. The maximum value of the amplitude equal to $0^m.2$ occurred in the blue and ultraviolet.

Key words: eclipsing binary – light variations outside eclipse

Introduction

ϵ Aur is an eclipsing binary with a period equal to 27.1 years. The last primary eclipse took place in 1955–1957. Any secondary eclipse has never been observed. Small fluctuations in the light curve of ϵ Aur have been found by Fredrick (1960), Gyldenkerne (1970), Kopylow and Kumajgorodskaja (1963) and Larsson-Leander (1958, 1961) during and near the primary eclipse. In the present paper the secondary fluctuations of the light curve entirely outside primary eclipse are studied as a continuation of the above mentioned investigations.

The observations were carried out through narrow band filters the characteristics of which are given in Table 1. HR 1729 served as comparison star. It was checked against HR 1494 and HR 1551 and found constant within $0^m.02$.

The observing period is entirely outside primary eclipse.

Observations

Photoelectric observations of ϵ Aur = HR 1605 = HD 31964 were carried out from 1960–1968 by members of the staff at Copenhagen University Observatory at Brorfelde. Three reflecting telescopes of 10, 16 and 20-inch were used.

Table 1. Characteristics of the filters

Peak wave lengths, Å	Half widths, Å
3500	80
3510	80
3520	80
4050	80
4240	80
4250	80
4510	80
4970	80
5520	110

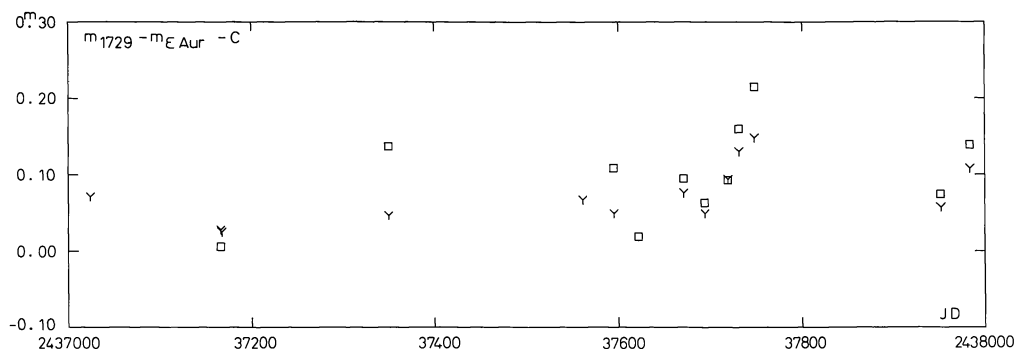


Fig. 1a

Fig. 1a–c. $m_{1729} - m_{\epsilon \text{ Aur}}$ normalized to zero on the mean of JD 2439077 and JD 2439081 plotted against Julian date. Explanation of the signatures: \circ 3500, 3510, 3520 Å, \square 4050 Å, \times 4240, 4250 Å, ∇ 4510 Å, \diamond 4970 Å, Υ 5520 Å

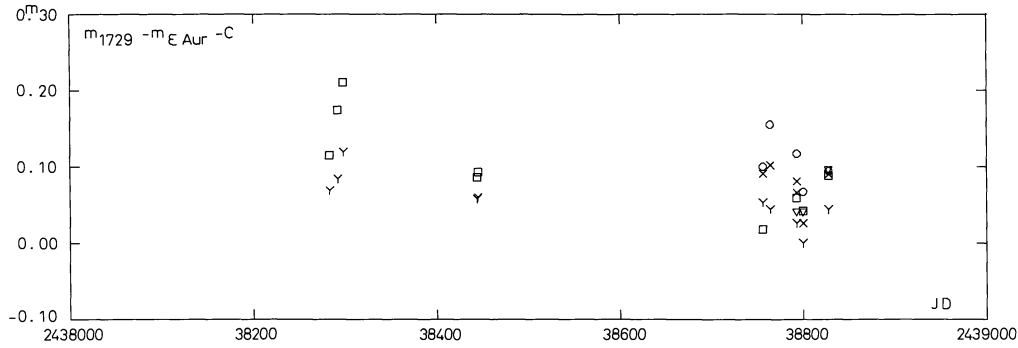


Fig. 1 b

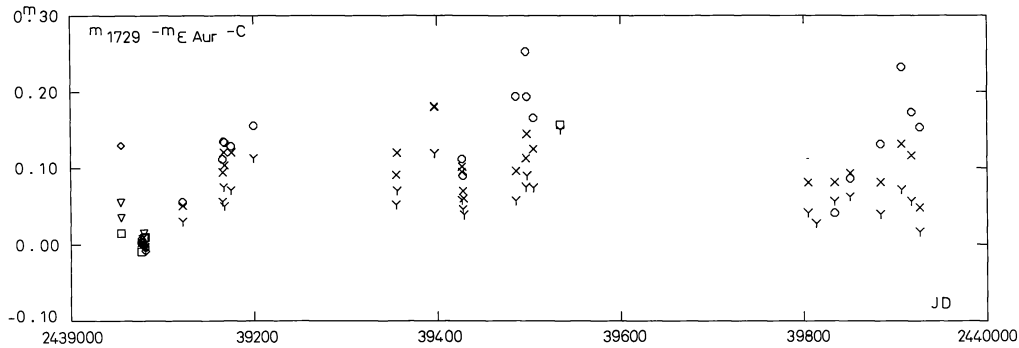


Fig. 1 c

The $m_{1729} - m_{\epsilon Aur}$ values obtained through filters of approximately the same peak wave lengths in different telescopes agree within the mean error in a way which allows a direct comparison of the observations without transformations. In Figs. 1a, 1b and 1c a normalized value, $m_{1729} - m_{\epsilon Aur} - C$, of the magnitude difference is plotted against Julian Date. C is defined as the mean value of $m_{1729} - m_{\epsilon Aur}$ observed on JD 2439077 and JD 2439081. These two dates were used since observations have been carried out in all colours and since ϵAur occurred in the same stage of its fluctuations on these dates. The following C values were calculated:

$$C(3520 \text{ \AA}) = 1^m086, \quad C(4050 \text{ \AA}) = 1^m785$$

$$C(4250 \text{ \AA}) = 1^m721, \quad C(4510 \text{ \AA}) = 1^m550$$

$$C(4970 \text{ \AA}) = 1.631, \quad C(5520 \text{ \AA}) = 1.642$$

From the figures it is concluded that fluctuations in the light curve occur in all colours and that the amplitude decreases with wave length. The maximum observed

amplitude equal to 0^m2 is found in the blue and ultra-violet.

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