OPTICAL SHORT-TERM VARIABILITY IN THE X-RAY-SELECTED BL LAC OBJECT IE 0317+186 AND THE RADIO-SELECTED BL LAC OBJECT ON231

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1. OBSERVATIONS

In order to compare X-ray-selected BL Lac objects with radio-selected BL Lac objects, we have carried out optical monitoring of some of these objects for about three years at Yunnan Observatory in China. All observations have been made with a CCD-image system at the f/13.3 Cassegrain focus of the 102-cm RCC telescope. The CCD-image system was developed by Ye et al. in Kitt Peak National Observatory of USA (Ye et al., 1985). The filters used were as follows: B-GG385(2mm)+BG12(1mm)+BG18(1mm), V-GG495(2mm)+BG18(2mm). After observing many times, more complete light curves have obtained for the X-ray-selected BL Lac object IE 0317+186 and the radio-selected BL Lac object ON 231, respectively(Fig 1 and Fig 2). Fig 1 shows that IE 0317+186 has a characteristic timescale of about 4.5hours with an amplitudes of $\Delta V \simeq 0.65$ mag. Fig 2 indicates that a timescale of short-term variability in ON 231 is about 70 min with an amplitudes of $\Delta B \simeq 0.8$ mag.

2. ARGUMENTS FOR RELATIVISTIC BEAMING

Using two methods, we discuss possibility of relativistic beaming for IE 0317+186 and ON 231. First method is that assuming the observed time variability, Δt_{ob}, the deduced Eddington luminosity $L_{Edd} \lesssim 2.60\times10^{42}\Delta t_{ob}$ erg/s. If the variable source luminosity $\Delta L \gg L_{Edd}$, relativistic beaming is suggested(Worrall 1986). Second one is according to $\eta \geq 5.0\times10^{-43}\Delta L/\Delta t$ (Fabian and Ress 1979), η is the efficiency of mass-to-energy conversion in the acctetion process. Our estimates are tabulated in Table I which shows that η of both IE 0317+186 and ON 231 are larger than 0.1, and relativistic beaming is a possible conclusion.

TABLE I The estimated results of physical parameters

Name	Z	$\Delta t(=\Delta t_{ob}/1+Z)$	L_{Edd}(erg/s)	L_{bol}(erg/s)	η	ref
IE 0317+186	0.19	1.36×10^{4} sec	4.21×10^{46}	3.38×10^{45}	$\geq$0.12	1
ON 231	0.102	3.80×10^{3} sec	1.10×10^{46}	2.02×10^{45}	$\geq$0.27	2,3,4

1. Giommi et al. 1987; 2. Worrall et al. 1986; 3. Madejski and Schwartz, 1983; 4. Weistrop et al. 1985.

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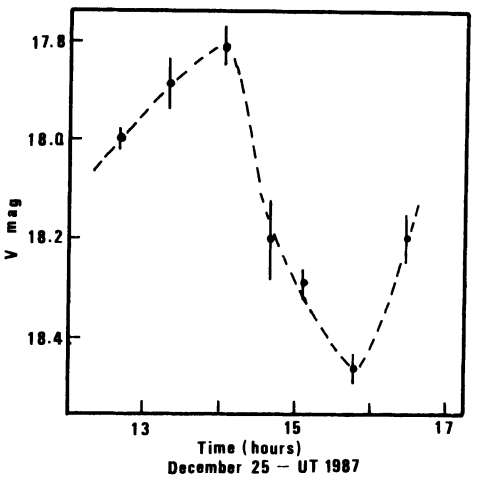

Fig 1. The light curve of IE 0317+186 in V band. Error bars are total error.

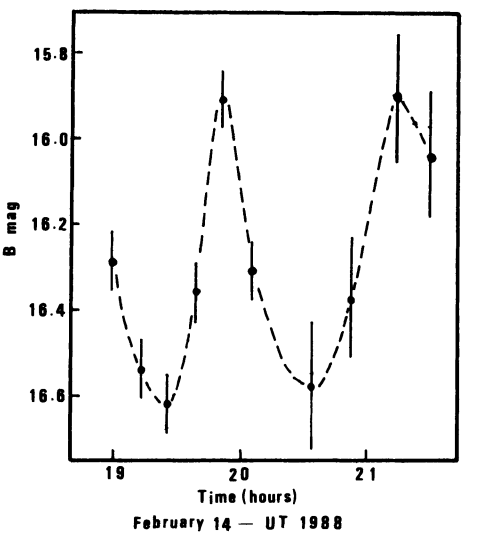

Fig 2. The light curve of ON 231 in B band. Error bars are total error.

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