

ISO observations of the BL Lac object PKS 2155–304

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1. Introduction

The Infrared Space Observatory¹ (ISO) observed the BL Lac object PKS 2155–304 fifteen times, from May 7 to June 8 1996. Twelve observations were carried out in a best sampled period of 15 days. Two additional observations were performed on 1996 November 23 and 1997 May 15. These observations were part of a multiwavelength monitoring which involved UV, X-ray, γ -ray satellites and ground based telescopes.

The instruments used were the ISOCAM camera in the range 2.5 – 18 μm and the ISOPHOT photometer, from 25 up to 170 μm .

2. The ISO light curves

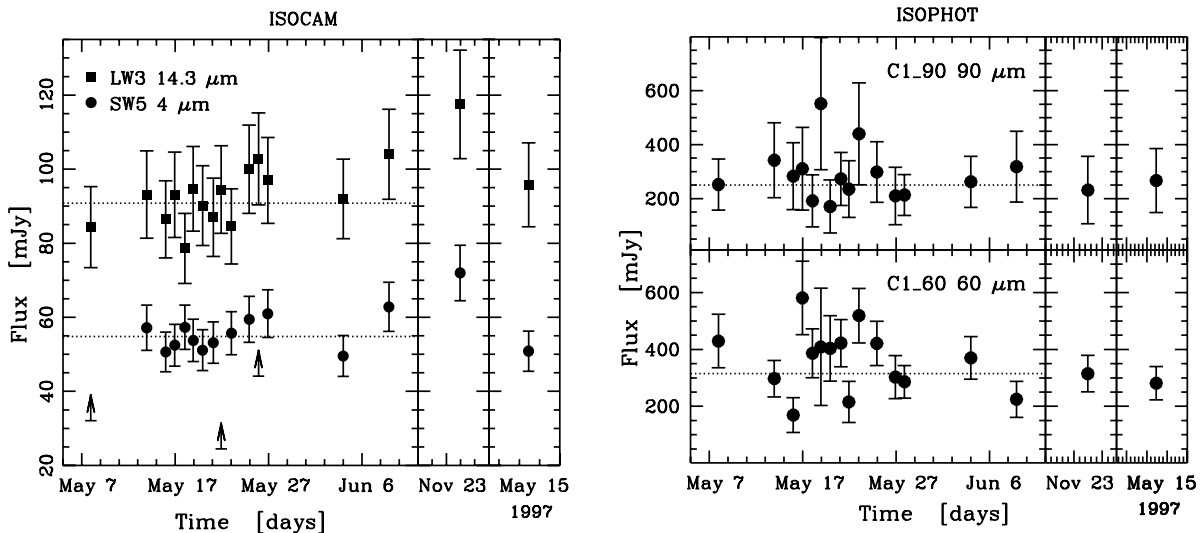


Figure 1: ISO light curves. Dotted lines are the mean flux values of the best sampled period.

The two ISOCAM light curves, at 4.0 and 14.3, μm and the two ISOPHOT light curves, at 60 and 90 μm , are shown in Fig. 1. There is no evidence of time variability of the flux

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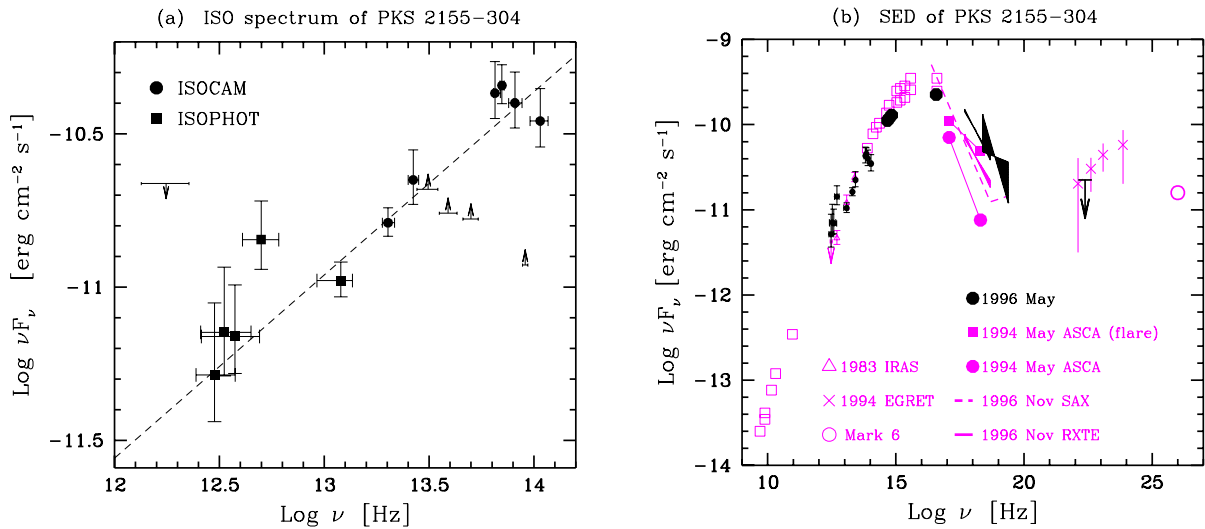


Figure 2: **(a)** ISO spectrum. **(b)** Spectral energy distribution of PKS 2155–304. Black points are the simultaneous data of 1996 May (Bertone et al. 1999; Urry et al. 1998; Marshall H.L., priv. comm.; Vestrand W.T., priv. comm.). Grey data are from literature.

at the four wavelengths, but the large errors (more than 10% for the camera fluxes and up to 50% for the photometer data) can hide smaller variations. We calculated the mean relative error and we obtained 3 sigma limits for the lowest detectable flux variations of 32%, 36%, 76% and 132% at 4.0, 14.3, 60 and 90 μm respectively. The mean flux values of the best sampled period, from 1996 May 13 to May 27, are 54.8 ± 1.8 mJy at 4.0 μm , 90.8 ± 3.2 mJy at 14.3 μm , 315 ± 27 mJy at 60 μm and 250 ± 34 mJy at 90 μm .

3. The ISO spectrum

The infrared spectrum of PKS 2155–304 was sampled, using 16 broad band filters, from 2.8 to 170 μm (Fig. 2a). It is well fitted with a single power law of energy spectral index $\alpha = 0.40 \pm 0.06$.

This power-law shape strongly supports the hypothesis that the far- and mid- infrared emission of this source is entirely generated by synchrotron process, excluding, therefore, important contributions from thermal sources. The emission of the host galaxy of PKS 2155–304, a big elliptical that is seen in NIR images (Kotilainen et al. 1998), is negligible at longer IR wavelengths (Bertone et al. 1999).

From the SED of the source in Fig. 2b, which shows the simultaneous data of 1996 May, one can notice that the ISO data lie well on the extrapolation between the radio and the optical data, and follow well the shape of the synchrotron peak, supporting the fact that the synchrotron emission is dominant in the ISO band.

References

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