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Short variability of the radio flux density from the blazar J0530+1331

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Abstract

© 2016, Pleiades Publishing, Inc. The results of observations of the quasar J0530+1331 (B0528+134) with the radio telescopes RATAN-600 at frequencies of 4.6, 8.2, 11.2, 21.7 GHz and RT-32 at the Zelenchukskaya and Badary observatories of the Quasar network of the Institute of Applied Astronomy, the Russian Academy of Sciences, at frequencies of 4.84 and 8.57 GHz in 2014–2015 are presented. A strong variability on a timescale of 20 days at 4.6–11.2 GHz has been detected over three months of daily RATAN-600 observations; the variability indices are $V = \Delta S / \langle S \rangle = 0.65 - 0.39$. The spectrum of the variable component is falling toward high frequencies with an index $\alpha = -0.76$. The structure and autocorrelation functions at 4.6 GHz show an additional process on a timescale of 7 days. No delay of the main process has been detected between 11.2 and 8.2 GHz; the delay between 8.2 and 4.6 GHz does not exceed two days. The most likely cause of the observed variability is the scattering by inhomogeneities of the interstellar medium. The variability has been obtained at the minimum activity phase of the source. The intraday variability (IDV) has been searched for at both RT-32 telescopes since April 2014. Out of 38 successful observing sessions for the source, only three have shown a variability on a timescale of four hours or more at a significance level no higher than 0.1%. This confirms our conclusion drawn from the previous IDV measurements for other sources that the IDV is observed mainly at the maximum phases of long-term variability of the sources.

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Keywords

active galactic nuclei, individual objects (J0530+1331), intergalactic and interstellar media