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Long-term variability of the radio source J0010+1058 in 2000–2013

Gorshkov A., Konnikova V., Mingaliev M., Kratov D.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015, Pleiades Publishing, Ltd. During thirteen-year monitoring of the source J0010+1058, four bursts have been observed with an amplitude greater than 1 Jy on a frequency of 21.7 GHz. Using autocorrelation functions, we determined the average characteristic burst time $\tau_{acf} \approx 1.55 \pm 0.1$ yr (max-min), identical at five frequencies: 2.3, 4.8, 7.7, 11.2, and 21.7 GHz, which provides the linear sizes of the emission region $R \approx c\tau_{acf} \approx 0.48$ pc, and the angular ones—0.28 mas; the brightness temperature is $0.6\text{--}6.5 \times 10^{11}$ K at the frequencies 21.7–2.3 GHz. Moreover, at frequencies higher than 2.3 GHz, there is one more characteristic time $\tau \approx 0.6$ yr. We estimated the average lag time of the bursts in relation to a frequency of 21.7 GHz as 150, 210, 270, and 390 days at 11.2, 7.7, 4.8, and 2.3 GHz respectively, and some other source characteristics. Spectra obtained in different periods of source activity confirm the model of the burst development as a result of the evolution of a shock wave propagating along the radio source jet.

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Keywords

galaxies, jets—radio continuum, Seyfert—galaxies