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Milliarcsecond Core Size Dependence of the Radio Variability of Blazars

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ABSTRACT

Studying AGN variability on timescales of months to years enables us to better understand the physical structure of AGNs on sub-parsec scales, and the physics of super massive black holes. Blazars are a class of AGNs whose relativistic jets point almost directly towards Earth, and are highly variable due to relativistic effects. In this study, we focus on the radio variability of 1158 blazars observed at 15 GHz through the Owens Valley Radio Observatory (OVRO) Blazar Monitoring Program (Richards et al. 2011), where these sources have been observed about twice a week over the past decade. We investigate why some blazar sources have relatively long variability timescales ($\sim$ years), while others have shorter variability timescales ($\sim$ months), by examining the dependence of the variability timescales on milliarcsecond source size measured using VLBI. We used the structure function to characterize the variability amplitude and variability timescale of each source. We found that the most compact sources at milliarcsecond scales exhibit stronger variability amplitudes and shorter variability timescales than more extended sources; this result can be explained by light travel-time effects.

REFERENCES

Richards, J. L., Max-Moerbeck, W., Pavlidou, V., et al.
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