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Studying the multi-wavelength properties of gamma-ray flaring blazars at redshift > 3

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High-redshift ($z > 3$) gamma-ray blazars offer the possibility to study black hole growth, accretion processes and jet acceleration in the early Universe. The most luminous blazars, detectable out to high redshifts, tend to have the peaks in their non-thermal spectral energy distributions (SEDs) at relatively low frequencies, with the high-energy peak often appearing at MeV energies. In addition, the cosmological redshift further shifts the SED peaks towards lower frequencies.
Because of their low fluxes and soft gamma-ray spectra, the detection of gamma-ray emission from these sources is difficult and only about a dozen have been detected by the Large Area Telescope (LAT) onboard the Fermi satellite.
Flaring events provide a unique opportunity to detect and characterize the gamma-ray emission from high-z blazars and to gather contemporaneous multi-wavelength observations that are necessary to interpret their broadband SED.
For this reason, we have designed a program to find flares in high-z blazars by using the public Fermi/LAT data, which is well-suited to triggering multi-wavelength observations.
In February 2022, we detected a flare from the very distant blazar GB 1508+5714 (z=4.31), whose detection at gamma-ray energies was reported in 2017. The flux increase was accompanied by a significant hardening of the gamma-ray spectrum. We obtained follow-up observations across the electromagnetic spectrum, with special focus on observations at radio frequencies. We launched a dense, long-term monitoring campaign with the Effelsberg radio telescope to study the radio-gamma correlation for the blazar. Previous VLBI observations revealed an extended jet emission from GB 1508+5714. Hence, we acquired three VLBI observations with the VLBA that are taken within eight months in order to search for potential changes in the appearance of the jet.

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