

A Multi-wavelength Study of a Long-Duration VHE flare from BL Lacertae with VERITAS

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Blazar variability, specifically in the very-high-energy (VHE; $E > 100$ GeV) regime, can powerfully probe the inner workings of jet dynamics that drive the emission we observe. In late Fall 2022, the Very Energetic Radiation Imaging Telescope Array System (VERITAS) observed VHE flaring activity from BL Lacertae on a much longer timescale than ever seen before. On October 15, 2022, the Fermi-Large Area Telescope detected elevated GeV activity originating from BL Lacertae. This triggered a multi-wavelength campaign, including observations from VERITAS, Swift, and optical and radio observatories. The VERITAS observations resulted in a strong VHE detection. While many rapid (≤ 1 day) VHE flares from the source have been observed previously, VERITAS continued to detect flaring activity from the source for over a month after the original flaring activity was detected, making this the longest duration VHE flare observed from BL Lacertae. While the spectral energy distribution is well described by a synchrotron self-Compton model with an external inverse-Compton component, the unprecedented duration of the flaring activity represents a challenge for current blazar emission models.

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