

## Exploring the Nature of the 2016 $\gamma$ -ray Emission in the Blazar 1749+096

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Recent Fermi-Large Area Telescope (LAT) light curves indicate an active  $\gamma$ -ray state spanning about five months from June 2016 to October 2016 in the BL Lac object 1749+096 (OT 081). During this period, we find two notable  $\gamma$ -ray events: an exceptionally strong outburst followed by a significant enhancement (local peak). In this study, we analyze multi-waveband light curves (radio, optical, X-ray, and  $\gamma$ -ray) plus very-long baseline interferometry (VLBI) data to investigate the nature of the  $\gamma$ -ray events. The  $\gamma$ -ray outburst coincides with flux maxima at longer wavelengths. We find a spectral hardening of the  $\gamma$ -ray photon index during the  $\gamma$ -ray outburst. The photon index shows a transition from a softer-when-brighter to a harder-when-brighter trend at around  $1.8 \times 10^{-7}$  ph cm $^{-2}$  s $^{-1}$ . We see indication that both the  $\gamma$ -ray outburst and the subsequent enhancement precede the propagation of a polarized knot in a region near the VLBI core. The highest polarized intensity, 230 mJy, and an electric vector position angle rotation, by  $\sim 32^\circ$ , are detected about 12 days after the  $\gamma$ -ray outburst. We conclude that both  $\gamma$ -ray events are caused by the propagation of a disturbance along the jet. We discuss possible scenarios to explain the observed results for each  $\gamma$ -ray event.