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Resolving High Energy Universe Using Strong Gravitational Lensing

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Extragalactic jets are the largest particle accelerators in the universe, producing radiation ranging from radio wavelengths up to very high-energy gamma rays. Spatial origin of gamma-ray radiation from these sources cannot be fathom due to the poor angular resolution of the detectors. We propose to investigate gravitationally lensed blazars. Cosmic lenses magnify the emission and produce time delays between mirage images. These time delays depend on the position of the emitting regions in the source plane. We combine the precisely measured time delays at gamma rays, well-resolved positions of radio images, a model of the lens and the Hubble constant to elucidate the origin of gamma-ray flares from bright blazar B2 0218+35. With this approach, we achieve 1 milliarcsecond spatial resolution of the source at gamma-ray energies. We find that the gamma-ray flares do not originate from the radio core as commonly assumed.

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