

The January 2017 Orphan Gamma-ray Flare from the Radio Galaxy NGC 1275: VERITAS and Multiwavelength Results

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NGC 1275 (3C84) is an active galactic nucleus (AGN) corresponding to the brightest cluster galaxy in the nearby Perseus supercluster of galaxies. As such, it has been the focus of intense study and monitoring across all wavebands for several decades. In 2010, it became one of the rare radio galaxies detected in very-high-energy gamma-ray emission (VHE; >100 GeV) with a reported flux by the MAGIC observatory of ~2.5% of the Crab Nebula and a soft energy spectrum with photon index of ~4. Since this discovery, the VERITAS observatory has monitored NGC 1275 every year. This presentation will describe the results of this long-term monitoring program with a particular focus on the extreme VHE flare displayed by NGC 1275 in early January 2017. Alerted by MAGIC on January 1, 2017 with a detection of NGC 1275 at a flux of ~150% Crab, VERITAS followed with observations on January 2, and 3, 2017 with the source still in a high state (65% Crab) but declining. Using data from radio, optical, X-ray and high-energy (HE) gamma rays, we will show the most complete simultaneous multiwavelength spectral energy distribution (SED) of the source for both the nights of January 1, and 2, 2017. It appears that the source was only flaring in gamma-rays –this ‘orphan flare’ condition strongly challenges standard emission scenarios. We present an emission model where the multiwavelength SED can be accurately depicted considering two interacting emitting zones at a few parsecs downstream from the core. The comparison of this scenario with other emission models proposed for NGC 1275, as well as the outstanding issues of TeV flares in radio galaxies are discussed.

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