

How can M87 flare so brightly at TeV energies?

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The super-fast (~day), very-high-energy (VHE; >0.1 TeV) photon flares from the nearby active galactic nucleus M87 provide a unique, exciting opportunity to fast-forward our understanding of particle acceleration in jets. Despite 5 detected VHE flares in the last 20 years and extensive multiwavelength (MWL) campaigns, the process and location of these VHE flares in the jet are still not fully understood. I will present a physically motivated model to further unravel this question, with a component of persistent emission from an MHD driven multizone jet (BHJet) in combination with a time-dependent flaring component (AM³). Furthermore, I will give an overview of my plans to tackle this problem from a different perspective, using high-resolution H-AMR GRMHD simulations enhanced with test-particles. Looking ahead, this work is also particularly relevant as a preparation for the confirmed 2-month EHT/MWL/VHE movie campaign in Spring 2026.

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