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Very rapid VHE flares from the radio galaxy IC310

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The galaxy IC310 in the Perseus cluster exhibits multi-TeV gamma-ray emission highly variable on time scales of minutes to years. An origin of the gamma rays from shocks in its one-sided radio jet can be ruled out. The emission region must be located very close to the supermassive black hole in the center of IC310. During the large-amplitude flux variations, the spectral shape remained invariant, consistent with particle injection far above 10 TeV followed by electromagnetic cascading, loading the jet with secondary electrons and positrons. Due to photo-meson production, high-energy neutrino emission is also expected. The observations are in line with models assuming proton acceleration by an electric field across a vacuum gap in the magnetosphere of a rapidly rotating black hole. Such transient, hard-spectrum spectral components may be common to all gamma-ray emitting AGN with low accretion rates and Poynting-flux dominated jets in which the thermal pair production rate does not suffice to provide the Goldreich-Julian charge density.