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A hadronic synchrotron mirror model for blazars - Application to 3C 279

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Blazars are a class of Active Galactic Nuclei (AGN) that are radio loud and have a small angle between the jet and the observer's line of sight. In some cases, flaring events in one frequency band are not accompanied by flaring in other bands. Such events are termed orphan flares. The causes of this variabil- ity and conditions in and location of the high energy emission region are not completely understood. As a possible explanation for rapid gamma-ray variabil- ity, the hadronic synchrotron mirror model is suggested. A TeV orphan flare without Fermi-LAT counterpart was observed on the 28th of January 2018 by the H.E.S.S. observatory from 3C 279. A primary flare was observed 11 days earlier by Fermi-LAT. The Fermi-LAT spectrum is used to constrain model parameters able to reproduce the proton-synchrotron SED through an analyt- ical fit to the data. The flaring very-high-energy emission is modeled by the hadronic synchrotron mirror model. First-principle analytical estimates predict a dense enough target photon field that is sufficiently efficient for photohadronic interactions to take place. Our numerical evaluation of this scenario reproduces a photo-pion induced very-high-energy gamma-ray flare without significant en- hancement of the Fermi-LAT flux. The photo-pion component of the spectrum is comparable in flux to that of the proton-synchrotron component.

Abstract field

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