Contribution ID: **85** Type: **Parallel Flash talk**

Photohadronic modelling of the 2010 gamma-ray flare from Mrk 421

Monday, 22 February 2021 11:35 (5 minutes)

Blazars are a subclass of active galactic nuclei (AGNs) that have a relativistic jet with a small viewing angle towards the observer. Recent results based on hadronic scenarios have motivated an ongoing discussion of how a blazar can produce high energy neutrinos during a flaring state and which scenario can successfully describe the observed gamma-ray behavior. Markarian 421 (Mrk 421) is one of the closest and brightest objects in the extragalactic gamma-ray sky and showed flaring activity over a 14-days period in 2010 March. In this work, we describe the performed analysis of Fermi-LAT data from the source focused on the MeV range (100 MeV–1 GeV), and study the possibility of a contribution coming from the pγ interactions between protons and MeV SSC target photons to fit the very high energy (VHE) gamma-ray emission. The fit results were compared with two leptonic models (one-zone and two-zone) using the Akaike Information Criteria (AIC) test, which evaluates goodness-of-fit alongside the simplicity of the model. In all cases, the photohadronic model was favored as a better fit description in comparison to the one-zone leptonic model, and with respect to the two-zone model in the majority of cases. Our results show the potential of a photohadronic contribution to a lepto-hadronic origin of the gamma-ray flux of blazars. Future gamma-ray observations above tens of TeV and below 100 MeV in energy will be crucial to test and discriminate between models.

Collaboration name

Primary authors: Mr ROSALES DE LEON, Alberto (Durham University); Dr BROWN, Anthony (Durham University); Prof. CHADWICK, Paula (Durham University, UK)

Presenter: Mr ROSALES DE LEON, Alberto (Durham University)

Session Classification: Astrophysical Models