

Multiwavelength correlation studies in the era of CTAO

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Correlations between various multiwavelength bands are an intermittent feature in blazar light curves; that is, they are observed in some instances but not in others. In order to understand the cause of this intermittency, high-cadence observations are required in as many bands as possible. In turn, correlations have been studied predominantly during flaring states. However, with the CTAO we will obtain detailed VHE gamma-ray light curves for many sources also during their low states enabling correlation studies of the VHE gamma-ray band with all other energy bands during both high and low states. The observed light curves can then be used to feed time-dependent models to reproduce the observed patterns as closely as possible and to check for the required parameter evolution. Here, we present the first steps in an ongoing effort within the CTAO. For two blazars, the HBL Mrk 421 and the FSRQ PKS 1510-089, the long-term X-ray and optical light curves are used to induce variations in input parameters of the lepto-hadronic one-zone code OneHaLe. The important outputs are light curves in the CTA energy range employing 3 different energy thresholds. The main initial results are: 1) the presence of relativistic protons has a significant effect on the correlation of the 3 light curves due to the emerging pair cascade which prolongs flaring states at the highest energies; and 2) comparison of the theoretical light curves with existing VHE gamma-ray data shows that both leptonic and hadronic models can only partially reproduce the data with the current simple setup.

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