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Impact of model parameter degeneracy on leptonic radiation models

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Blazars are luminous astrophysical objects that show a high variability in brightness. They emit powerful relativistic jets which are aligned with the observer's line of sight. The broad emission from radio up to gamma rays can be explained by interactions of non-thermal particles in the jet. Nonetheless, the origin of the high-energy emission of blazars is still not clear. Various theoretical models have been proposed to explain the production of blazar radiation. The one-zone leptonic model describes the low-energy emission as synchrotron photons emitted by electrons, which are then upscattered to higher energies by the same electrons. However, one-zone leptonic models have a high number of free parameters leading to possible degeneracy of the modeling results. This work aims to determine the extent to which we can constrain the parameters based on the available data. We apply and compare five different methods of searching for the best-fit parameters. Using the visualization tool t-SNE, the high-dimensional parameter space is visualized with the aim to show parameter sets of the leptonic model with higher similarities closer to each other. The parameter space is analyzed with simulated and observational data of blazar PKS 0735+178 and Markarian 501. We present the maps of the parameter space and discuss the physical implications of the obtained results.

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