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Multi-wavelength data analysis with the threeML framework

With an increasing number of observatories making their data publicly available, we have truly reached the era of multi-wavelength astronomy. Combining gamma-ray data from multiple instruments as well as with measurements at other wavelengths is needed to unlock the data's full potential. However, lack of standardization as well as unique challenges of each instrument can make combining data from multiple instruments a challenging and time-consuming task.

ThreeML, the multi-mission maximum likelihood framework, is a python-based software package for multi-wavelength data analysis with a special focus on high-energy astronomy. Its flexible, plugin-based structure enables the inclusion of data from many different observatories in their diverse native formats without much additional effort by the user. ThreeML relies on astromodels, a flexible modeling framework, for the description of astronomical sources. Source modeling and data access are thus separate from likelihood optimization, and can be combined in a flexible manner. In addition to the (frequentist) maximum likelihood analysis, threeML also allows for Bayesian analysis via sampling of the posterior distribution. I will report on the current status of threeML and astromodels, and show some examples for joint likelihood fits using threeML.

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