Contribution ID: **37** Type: **Short talk**

Machine Learning Enhanced Photometric Analysis of the Extremely Bright GRB 210822A

Monday, 5 May 2025 15:30 (7 minutes)

We apply machine learning techniques to model the multi-wavelength emission of the extremely bright GRB 210822A using the AFTERGLOWPY library. This approach allows us to estimate the observer angle θ_{obs}, the initial energy E_0, the electron index p, the thermal energy fractions in electrons (ϵ_e) and in the magnetic field (ϵ_B), the efficiency χ, and the density of the surrounding medium n_0. To achieve this, we train a neural network on 30,000 synthetic AFTERGLOWPY light curves and apply it to this event.

We also analyse the temporal and spectral evolution of the optical and X-ray emissions. Our results show that a reverse shock component dominates the early-time emission, while a jet break is observed at later times. This break allows us to constrain the jet opening angle θ_j to a value consistent with that obtained through the machine learning code.

Primary author: Ms ANGULO-VALDEZ, Camila (Instituto de Astronomía, Universidad Nacional Autónoma de México)

Co-authors: Dr BECERRA, Rosa L (Department of Physics, University of Rome - Tor Vergata); Dr PEREYRA, Margarita (Instituto de Astronomía, Universidad Nacional Autónoma de México); Mr GARCIA-CIFUENTES, Keneth (Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México); Dr VARGAS, Felipe (Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México); Dr WATSON, Alan M. (Instituto de Astronomía, Universidad Nacional Autónoma de México); Dr DE COLLE, Fabio (Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México)

Presenter: Ms ANGULO-VALDEZ, Camila (Instituto de Astronomía, Universidad Nacional Autónoma de México)

Session Classification: Monday afternoon

Track Classification: Gamma-ray bursts