



MACHINE LEARNING FOR ASTROPHYSICS

2ND EDITION CATANIA, 8-12 JULY, 2024

Contribution ID: 228

Type: **not specified**

Unsupervised learning for GRBs classification

Wednesday, 10 July 2024 09:40 (20 minutes)

Gamma-Ray Bursts (GRBs) are among the most energetic events in the universe. They can last from a few milliseconds to hours, and their multiwavelength and multimessenger observations allow us to probe physics beyond extremes that can be achieved in terrestrial laboratories. While huge progress has been made in the last decades, much remains to be uncovered regarding the origins and underlying mechanisms of GRBs.

The categorization of these bursts is a primary objective of the GRBs research, and some machine learning techniques have already been explored for this task. We propose a new fast GRB classification tool based on modern unsupervised deep learning techniques and relying on a set of inputs which have not yet been explored within the machine learning framework, the GRB waterfalls. This set contains the core prompt information relevant for GRB classification, such as duration, temporal variation, pulse structure, spectral hardness and evolution, and how these parameters relate. We used this dataset to train convolutional autoencoders, achieving promising and insightful results regarding GRBs categorization.

Presenter: CIBRARIO, Nicolò

Session Classification: Time Domain / Multi-wavelength All-Sky Surveys