SPECTRA & GRAIL

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The SPECTRA AI project addresses the challenge of identifying and classifying transient gamma-ray emissions in Fermi LAT observations using advanced artificial intelligence methods. Transient phenomena such as gamma-ray bursts and flares exhibit complex spatio-temporal dynamics, necessitating robust pattern-recognition frameworks.

The GRAIL project (Gamma-Ray Imaging with Deep Learning) aims to develop a novel approach for the analysis of calorimetric data in space by integrating artificial intelligence directly onboard satellites. Space-based calorimeters generate massive volumes of high-resolution spatial data, but their transmission to Earth is limited by severe bandwidth and energy constraints. GRAIL addresses this challenge by developing an end-to-end AI pipeline capable of real-time particle classification—such as electron vs proton discrimination—directly on low-power embedded systems.

Presenter: GARINEI, Alberto (UniMarconi) **Session Classification:** Bandi a Cascata