



Contribution ID: 337

Type: Oral Presentation

Compton polarization signatures in gamma-ray burst models

Tuesday, 4 July 2023 11:40 (20 minutes)

Since the first detection of gamma-ray bursts (GRBs) in 1967, GRBs have been an active subject of study with many questions still left unanswered. Though the physics of GRB afterglows is relatively simple and more well known, there is still much discussion regarding that of the prompt emission phase of GRBs. Several models, including synchrotron models with both ordered and random magnetic fields, synchrotron self-Compton models as well as Compton-drag models and photospheric models have been proposed in order to explain the Band-like spectra of GRB prompt emissions. Seeing as both synchrotron radiation and anisotropic Comptonization (as expected in both photospheric and Compton-drag models) may lead to X-ray polarization, it is inevitable that polarization predictions from the various proposed models should be used in conjunction with X-ray polarization measurements by POLAR and possibly the future COSI missions in order to investigate the emission mechanisms of GRBs. In light of this, we develop a Monte Carlo polarization code, heavily inspired by the MAPPIEs code, to estimate Compton polarization signatures from various GRB models in order to constrain and hopefully discriminate between the available models.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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Session Classification: Astrophysics & Space Science

Track Classification: Track D1 - Astrophysics