Contribution ID: **376** Type: **Invited talk in the parallel session**

Monte Carlo Simulations of Photospheric Emission in Gamma Ray Bursts

Monday, 5 July 2021 18:10 (30 minutes)

The study of Gamma Ray Bursts (GRBs) has the potential to improve our understanding of high energy astrophysical phenomena. In order to reliably use GRBs to this end, we first need to have a well-developed grasp of the mechanism that produces the radiation within GRB jets and how that relates to their structure. One model for the emission mechanism of GRBs invokes radiation produced deep in the jet which eventually escapes the jet at its photosphere. While this model has been able to explain a number of observed GRB characteristics, it is currently lacking in predictive power and in ability to fully reproduce GRB spectra. In order to address these shortcomings of the model, we have expanded the capabilities of the MCRaT code, a state of the art radiative transfer code that can now simulate optical to gamma ray radiation propagating in a hydrodynamically simulated GRB jet. Using the MCRaT code, we have constructed mock observed light curves, spectra, and polarization from optical to gamma ray energies for the simulated GRBs. Using these mock observables, we have compared our simulations of photospheric emission to observations and found much agreement between the two. Furthermore, the MCRaT calculations combined with the hydrodynamical simulations allow us to connect the mock observables to the structure of the simulated GRB jet in a way that was not previously possible. While there are a number of improvements that can be made to the analyses, the steps taken here begin to pave the way for us to fully understand the connection between the structure of a given GRB jet and the radiation that would be expected from it.

Primary author: PARSOTAN, Tyler

Co-author: Prof. LAZZATI, Davide (Oregon State University)

Presenter: PARSOTAN, Tyler

Session Classification: Photospheric Emission in GRBs

Track Classification: Fast Transients: Photospheric Emission in GRBs