UHECR and neutrino production in GRB multi-collision models

Tuesday 3 December 2019 17:10 (20 minutes)

In this talk I will dicuss the production of multiple messengers in multi-collision models of gamma-ray bursts (GRBs). In the internal shock model for GRBs, their prompt emission is generated by collisions of regions with different Lorentz factors in the GRB jet (shells). Multi-collision models take the full dynamic of the jet into account generating a range of collisions happening at different radii. This separates the production of different messengers: While neutrinos are dominantly produced at small radii, ultra-high energy cosmic rays (UHECRs) escape mostly at intermediate radii. This can significantly reduce the neutrino flux from GRBs compared to the simpler one-zone models of GRBs.

I will explain the impact of two important model assumptions - the two-shell-collision dynamics and initial engine setup - on the ejected spectra of UHECRs and neutrinos. I will also dicuss the requirements for fitting the UHECR spectrum and composition within this model while taking into account neutrino constraints.

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Session Classification: Parallel

Track Classification: Cosmic rays