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Emission from Structured GRB Jets: Theoretical Overview

Monday, 5 July 2021 17:30 (30 minutes)

The unprecedented coincident detection of a short gamma-ray burst (GRB) with gravitational waves from a binary neutron star (BNS) merger in GW170817/GRB170817A, followed by the long-lasting broadband afterglow, put our understanding of the structure of GRB jets to the test. GRB170817A turned out to be a particularly interesting event, due to its nearby distance (~ 40 Mpc) and emission from an off-axis jet, that gave us a range of new insights and confirmed some old ones. The most important of which is the unequivocal realization that GRB jets have angular structure. This has important implications for the detection and understanding of future such events. In this review talk, I will present the theory of emission from structured GRB jets, covering both prompt and afterglow emission. I will highlight the differences between off-axis emission from the simpler and often used top-hat jet model and the structured jets using the prompt and afterglow observations of GRB170817A. The full range of afterglow lightcurves that can be observed from an off-axis structured jet will be discussed. Important diagnostics, namely the afterglow flux centroid motion, image size, and polarization, that can be used to understand the outflow structure and properties of the post-shock magnetic field in future events will be discussed.

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Session Classification: Electromagnetic Counterparts of Compact Binary Mergers

Track Classification: Fast Transients: Electromagnetic counterparts of compact binary mergers