

Long GRBs, Low Luminosity GRBs and Supernovae

Monday, 16 May 2022 09:30 (40 minutes)

According to the Collapsar model, Long GRBs arise during a collapse of a massive star. The collapsing core produces a jet that penetrates the stellar envelope and the gamma-rays are generated once the jet is well outside the star. The jet propagation inside the stellar envelope is not simple. The interaction of the jet with the envelope dissipates the jet energy (as long as the jet is within the star) producing a hot cocoon. At times the jet is choked within the star and in this case, we may still observe directly its existence as the cocoon break out from the star produces a low luminosity GRB. I will provide observational evidence for that. Remarkably, as we show here, we may even identify the existence of a choked jet in cases when the low luminosity GRB is not detected. The cocoon leaves a unique signature of fast-moving matter that engulf the supernova. The observational imprint of such fast moving matter has been detected in several supernovae. If time permits, I will also discuss links of these ideas to the mechanisms that operate in short GRBs.

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Session Classification: Morning session