



# Are low luminosity GRBs generated by relativistic jets?

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Low luminosity gamma-ray bursts (ll-GRBs) constitute a sub-class of gamma-ray bursts (GRBs) that plays a central role in the GRB-supernova connection. While ll-GRBs differ from typical long GRBs (LGRBs) in many aspects, they also share some common features. Therefore, the question whether the gamma-ray emission of ll-GRBs and LGRBs has a common origin is of great interest. Here we address this question by testing whether ll-GRBs, like LGRBs according to the Collapsar model, can be generated by relativistic jets that punch holes in the envelopes of their progenitor stars. The collapsar model predicts that the durations of most observed bursts will be comparable to, or longer than, the time it takes the jets to breakout of the star. We calculate the jet breakout times of ll-GRBs and compare them to the observed durations. We find that there is a significant excess of ll-GRBs with durations that are much shorter than the jet breakout time and that these are inconsistent with the Collapsar model. We conclude that the processes that dominate the gamma-ray emission of ll-GRBs and of LGRBs are most likely fundamentally different.

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