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Radio Observations Of GRB 100418a: Test Of An Energy Injection Model Explaining Long-Lasting GRB Afterglows

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Abstract content
   (Max 300 words)
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In this talk, I will highlight the results of our observational campaign on GRB 100418a in the radio band, for which the Australia Telescope Compact Array (ATCA), the Very Large Array (VLA) and the Very Long Baseline Array (VLBA) were used. GRB 100418a was a peculiar GRB and it had unusual X-ray and optical afterglow profiles featuring a plateau phase with a very shallow rise. This observed plateau phase was believed to be a signature of some sort of an energy injection mechanism, which kept powering the forward shock continuously, giving rise to an unusual and long-lasting afterglow. The radio afterglow of GRB 100418a was detectable several months after the prompt emission. We conducted long-term monitoring observations of the radio afterglow and attempted to test the postulate of energy injection model which advocates that the continuous energy injection is due to shells of material moving at a wide range of Lorentz factors. We obtained an upper limit of $\gamma < 7$ for the expansion rate of the GRB 100418a radio afterglow, indicating that the range-of-Lorentz factor model could only be applicable for relatively slow moving ejecta. A preferred explanation could be that its actually the continued activity of the central engine that may have continuously powered the long-lasting afterglow. We further concluded that a plateau phase in X-ray and/or optical afterglow profile can potentially be taken as an indicator of the possible longevity of the radio afterglow of a GRB, further reaffirming the role of energy injection in giving rise to long-lasting afterglows.

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