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Magnetar Giant Flare Origin of Gamma-Ray Burst

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The giant flares of soft gamma-ray repeaters (SGRs) have long been proposed to contribute to at least a subsample of the observed short gamma-ray bursts (GRBs). We performed a comprehensive analysis of the high-energy data of the bright short GRB 200415A, which was located close to the Sculptor galaxy. Our results suggest that a magnetar giant flare provides the most natural explanation for most observational properties of GRB 200415A, including its location, temporal and spectral features, energy, statistical correlations, and high-energy emissions. On the other hand, the compact star merger GRB model is found to have difficulty reproducing such an event in a nearby distance. Future detections and follow-up observations of similar events are essential to firmly establish the connection between SGR giant flares and a subsample of nearby short GRBs.

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