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Exploding Stars with Magnetic Towers DMITRI UZDENSKY, Princeton University and CMSO, ANDREW MACFADYEN, Institute for Advanced Study — We consider the formation and propagation of a magnetically dominated outflow, similar to Lynden-Bell's "magnetic tower," inside a collapsing star. We calculate the structure of this flow as it burrows through the stellar envelope. The passage of the tower through the star drives a strong bow shock behind which an over-pressured cocoon forms. In turn, the cocoon collimates the tower forming a narrow jet-like structure. The channel cleared by the expanding tower is plausibly free of baryons and allows the escape of magnetic energy from the central engine through the star. Applications include asymmetric supernova explosions, collapsars and GRBs.

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