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Shock Breakout and Shock Interaction Mission. PETE ROMING, Southwest Research Institute, CHRIS FRYER, Los Alamos National Lab, AMANDA BAYLESS, Southwest Research Institute — Supernovae (SNe) are keystone astrophysical objects that have played a vital role in the formation and evolution of our universe. Despite our progress in unraveling how they behave, our understanding of them is still quite limited. To address this deficiency, we propose a relatively inexpensive space-based mission that focuses on two primary science goals: 1) constraining the poorly understood explosion mechanism of core collapse supernovae (CCSNe) which directly affects our understanding of massive star progenitors over cosmic time, and 2) unravelling variations in the standardization of Type Ia SNe used as cosmological standard candles by studying the interaction between the companions. The science goals are achieved through measuring the parameters of the outer envelope of exploding massive stars by observing the shock breakout (SBO) and post-SBO phases of CCSNe, and determining the companions of Type Ia SNe by probing their shock interaction after explosion. Here we detail the science cases and the mission profile.

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