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The Interplay of Opacities and Rotation in Promoting the Explosion Core-Collapse Supernovae DAVID VARTANYAN, ADAM BURROWS, DAVID RADICE, Princeton Univ — For over five decades, the mechanism of explosion in core-collapse supernovae has been a central unsolved problem in astrophysics, challenging both our computational capabilities and our understanding of relevant physics. Current simulations often produce explosions, but they are at times underenergetic. The neutrino mechanism, wherein a fraction of emitted neutrinos is absorbed in the mantle of the star to reignite the stalled shock, remains the dominant model for reviving explosions in massive stars undergoing core collapse. We present here a diverse suite of 2D axisymmetric simulations produced by FORNAX, a highly parallelizable multidimensional supernova simulation code . We explore the effects of various corrections, including the many-body correction, to neutrino-matter opacities and the possible role of rotation in promoting explosion amongst various core-collapse progenitors.

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