

## Beyond the standard supernova model: alternative approaches to the core-collapse supernova mechanism

The explosion mechanism of core-collapse supernovae remains one of the biggest open questions in astrophysics. Current efforts in core-collapse supernova modeling tend to focus on hydrodynamics effects, such as the standing accretion shock instability (SASI) and neutrino heated convection. However, these are not the only possibilities: there are many phenomena in nuclear and neutrino physics that may significantly contribute to shock reheating in core-collapse supernovae. I will address oscillations between electron neutrinos and a fourth, sterile neutrino species, which can provide additional neutrino reheating and lead to higher explosion energies. I will also discuss the possibility of a phase transition to quark-gluon plasma at densities above nuclear matter density, which may occur in the collapsing supernova core. I will present the viability of these mechanisms in the context of core-collapse supernovae and other constraints from physics and astronomy.

Thanks,  
MacKenzie