Contribution ID: **150** Type: **Poster**

PUSHing Core-Collapse Supernovae to Explosions in Spherical Symmetry: Explodability and Global Properties

Tuesday, 26 June 2018 19:00 (1h 30m)

Core-collapse supernovae (CCSNe) are energetic explosions occurring at the end of the evolution of massive stars that provide the conditions for the synthesis of elements beyond iron and contribute to the galactic chemical evolution. Decades of research have not fully uncovered the detailed mechanism behind these complex explosions. Multi-dimensional simulations are crucial to investigate the mechanism, but computationally too demanding to investigate global properties of large samples of progenitor models. For this, spherically symmetric simulations are still the best-suited tool at the present time. The PUSH method [1] represents a well-suited parametrized framework to investigate the neutrino-driven mechanism in one-dimensional simulations to efficiently study important aspects of CCSNe like the effects of the shock passage through the star, the progenitor-remnant connection [2] and explosive nucleosynthesis [3]. With a calibration of the method to SN1987A and other observed CCSNe we explore the explodability and global properties of CCSN simulations for a large mass range of available solar metallicity progenitors.
We find, among other properties, the explosion energies, ejected nickel masses, and remnant masses for the investigated progenitor samples and predict the resulting neutron star and black hole birth mass distributions.

[1] A. Perego, M. Hempel, C. Fröhlich, K. Ebinger et al., ApJ 806, 275 (2015).
[2] K. Ebinger, S. Curtis, C. Fröhlich et al., (submitted for publication).
[3] S. Curtis, K. Ebinger, C. Fröhlich et al., (submitted for publication).

Summary

hydrodynamics, nucleosynthesis, neutron stars, supernovae, SN1987A

Primary author: EBINGER, Kevin (GSI)

Co-authors: PEREGO, Albino (MIB); Prof. FROHLICH, Carla (NC State University); Prof. THIELEMANN, F.-K. (University of Basel); Dr HEMPEL, Matthias (University of Basel); Prof. LIEBENDOERFER, Matthias (University of Basel); CURTIS, Sanjana (North Carolina State University)

Presenter: EBINGER, Kevin (GSI)

Session Classification: Poster session