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# The neutrino process in self-consistent supernova simulations

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Neutrinos play a curcial role for core-collapse supernova explosions and their nucleosynthesis.
All flavors of neutrinos are emitted from the hot and dense environment of a collapsing massive star in such tremendous numbers that they not only help to revive the explosion shock wave but also affect the composition of the outer layers of the star that have been chemically enriched during the life of the progenitor star. The neutrinos carry high energies compared to the thermal energies encountered in the stellar mantle and can either be captured on nuclei in an inverse beta decay or induce spallation reactions, i.e. lead to nuclear excitations that decay by particle emission. The effect of these interactions on the final composition of the ejecta is called the nu-process and has been suggested to contribute to the production of 7Li, 11B and 19F as well as 138La and 180Ta. For the first time we have investigated this process with a set neutrino-nucleus cross sections for all nuclei in the reaction network, including multi-particle emission channels and based on experimental data where available. We have explored a range of 1D models of piston driven explosions and for tracers from 2D self-consistent simulations from the Oak-Ridge group. With tracers from a 2D supernova simulation have studied the nu-process in the innermost ejecta where the neutrino fluxes are highest.
This also allows us to study the nu-process with neutrino properties that are consistent with the explosion and we find that the time dependent realistic neutrino properties have important effects on nu-process nucleosynthesis and might provide the key to reconcile a low production of 11B with sufficiently high yields of 138La and 180Ta to explain their solar abundances.

## Summary

We have studied the neutrino process in core-collapse supernovae with a complete set of cross sections using 1D calculations and also tracer particles from self-consistent 2D simulations and find that the details of neutrino properties might help to explain the solar abundances of 11B, 138La and 180Ta.

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