

Signatures of dark matter sterile neutrinos in core-collapse supernovae

Tuesday, 5 May 2015 14:23 (22 minutes)

The nature of dark matter and the explosion mechanism of core-collapse supernovae may both be explained by the presence of a sterile neutrino. Observations of galaxies and galaxy clusters are indicative of a $\sim\text{keV}$ mass sterile neutrino. Oscillations between an electron neutrino and a sterile neutrino in the $\sim\text{keV}$ mass range may provide an efficient energy transport mechanism between the proto-neutron star and stalled shock wave. We have performed simulations of core-collapse supernovae for a range of sterile neutrino masses and mixing angles that are consistent with dark matter. We have found that, for many choices of mass and mixing angle, the presence of a sterile neutrino is sufficient to enhance the neutrino reheating and result in a successful explosion.

Primary author: WARREN, MacKenzie (University of Notre Dame)

Co-authors: Prof. MATHEWS, Grant (University of Notre Dame); Dr HIDAHA, Jun (National Astronomical Observatory of Japan); Dr MEIXNER, Matthew (University of Notre Dame); Prof. KAJINO, Toshitaka (National Astronomical Observatory of Japan)

Presenter: WARREN, MacKenzie (University of Notre Dame)

Session Classification: Dark Matter

Track Classification: Dark Matter (Theory / Experiment)