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“Neutrino-Nucleon scattering in the neutrinosphere”

I will present a calculation of the neutrino-neutron differential scattering rate in neutron matter. The in-medium neutrino neutron scattering rate is relevant for the evolution of supernovae where neutrinos propel supernova matter outward via scattering. In-medium scattering also influences the distribution of elements which form via the r-process. To calculate the differential scattering rate, we employ the virial expansion and we include effects due of the strong interaction for the first time. We find that in neutron matter neutrino backscattering is suppressed relative to previous estimates where the strong interaction is neglected. Suppressed backscattering causes neutrinos to be emitted from the core of a supernova at a higher temperature than previously expected; this heightened temperature may assist in the revival of a stalled supernova shockwave, which is an outstanding puzzle observed in numerical simulations.



Supernova 1987A, also called SN 1987A, the brightest supernova observed in over 400 years. Wavelengths ranging from X-ray to millimeter are colorized for visualization. This photo combines data from both the Hubble Telescope and the CHANDRA x-ray observatory

