

Boiling of nuclear liquid in core-collapse supernova explosions

P.I. Fomin, D. Iakubovskiy, Yu. Shtanov

Bogoliubov Institute for Theoretical Physics, BITP (Kiev, Ukraine)

We investigate the possibility of the boiling instability of nuclear liquid in the inner core of a proto-neutron star formed in a core collapse of type II supernova. We derive a simple criterion for boiling to occur. Using this criterion for one of best elaborated equations of state of supernova matter, we find that boiling is quite possible under the conditions realized inside the proto-neutron star. We discuss consequences of this process, such as the increase of heat transfer rate and pressure in the boiling region. We expect that the implementation of this effect into the conventional neutrino-driven delayed-shock mechanism of type II supernova explosions can increase the explosion energy and reduce the mass of the neutron-star remnant.