

BOILING OF NUCLEAR LIQUID IN CORE-COLLAPSE SUPERNOVA EXPLOSIONS

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S u m m a r y

We investigate the possibility for the boiling instability to appear in a nuclear liquid in the inner core of a proto-neutron star (PNS) formed in the core collapse of a type II supernova. We derive a simple criterion for boiling to occur. Using this criterion for one of the best described equations of state of the supernova matter, we find that boiling is quite possible under the conditions realized inside the proto-neutron star. We discuss the consequences of this process such as an increase of the heat transfer rate and the pressure in the boiling region. We expect that taking this effect into account in 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.