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Nuclear isomers in neutron stars

In fact, nuclear isomers are studied in rapid neutron capture process so-called r - process of the nucleosynthesis in neutron stars which occurs at the energy state about several MeV (dozens of GK) causing cooling of the star matter. Thus, isomers freeze out in thermal equilibrium due to cooling the neutron star matter by the r - process, i.e. they can immediately be populated in the star medium as it is in astrophysical isomers (astromers). There are two different main states of the astromers: ground state, where the isomer transition rates characterize; and thermalization temperatures, which describes the transition rates between pairs in the nuclear states. Studying unknown behaviour of astromers in models of neutron star matter may be helpful in understanding the cooling processes, in particular, in estimations of age of radio pulsars.

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