

SEMINÁŘ OTF ÚJF, ŘEŽ

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**Thermal effects on weak interaction  
mediated processes in a collapsing star**

**Abstrakt**

Thermal effects on the cross-sections and rates for weak interaction mediated processes occurring under supernova conditions are studied. We apply the quasiparticle random phase approximation extended to finite temperatures (TQRPA) by the thermofield dynamics formalism. The approach enables systematic studies of the processes with hot nuclei in a thermodynamically consistent way. For relevant supernova temperatures we calculate electron capture rates and neutral-current neutrino-nucleus cross sections for the sample nuclei  $^{56}\text{Fe}$  and  $^{82}\text{Ge}$ . In agreement with the earlier shell-model studies, we observe a significant thermal enhancement in the rates of both processes.

However, in some cases the calculated within TQRPA finite temperature rates significantly exceed the shell-model results. The discrepancy is explained by the fact that, in contrast to the TQRPA, shell-model calculations employ the Brink hypothesis when treating transitions from thermally excited nuclear states.

**Seminář se koná v pátek 24. 4. 2015 v 10:30 hod.  
v seminární místnosti OTF ÚJF Řež**

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