



RCNP SEMINAR

Research Center for Nuclear Physics, Osaka University

Speaker Prof. August Wierling
(Institut für Physik, Universität Rostock, Germany)

Title Screening corrections to nuclear reaction rates
in astrophysical plasmas at intermediate coupling

Time&Date 13:00 -, April 27(Tue) , 2010

Place Lecture room, 4th floor , RCNP, Osaka University

Abstract

Nuclear reaction rates in stellar interiors are modified from the laboratory value due to the existence of correlations in the plasma environment. For strongly coupled plasma, significant correlations are encountered.

Screening but also degeneracy are playing an important role e.g. in the interior of Brown dwarfs. The talk starts from a quantum statistical description of reaction rates and illustrates the use of thermodynamic Green's function techniques to systematically account for correlation effects. The success of this method is discussed for laboratory plasmas by analyzing optical properties such as pressure broadening and pressure ionization. As a specified example, the electron capture by ${}^7\text{Be}$ under solar core conditions is studied. Also, deuterium burning in brown dwarfs is discussed.