Nuclear Seminar

Weak Decay Properties from QRPA Calculations with Realistic Forces

Dong-Liang Fang, NSCL / MSU

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The r-process simulation is an interesting topic in Nuclear Astrophysics, as the r-process together with other astrophysical process provides the possible explanation of the element abundance of our solar system and even our universe. As the inputs, weak decay rates including the half-lives and beta-delayed neutron emission probabilities play important roles in the simulation, and accurate determination of these properties are crucial for the final product of the simulation. To calculate the weak decay rate, various methods have been applied, from the exact shell model calculations to different approximations. Exact solution as shell model can only deal with limited numbers of nuclei due to the large configuration space. So methods with approximation are needed, of which QRPA methods with various version are widely used in this calculations. In our calculation, we adopt the QRPA with realistic forces for both deformed and spherical nuclei. We obtain acceptable agreement with experiments and make predictions for nuclei which are currently out of the reach of experiments. The future plan is to make r-process simulations with the new data sets and investigate the effect of weak decay rate on the element abundance.

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