

Seminarium Zakładu Fizyki Teoretycznej

Departament Badań Podstawowych
Narodowego Centrum Badań Jądrowych

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pawilon NCBJ, sala 22, Hoża 69

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"HOW TO INTERPRET THE EFFECTS OF THE GAUGE ANGLE IN NUCLEAR REACTIONS?"

ABSTRACT: Recently, with new Time-dependent Hartree-Fock-Bogoliubov codes, the effects of the relative gauge angle in reactions have been studied. It has been shown that the fusion barrier is changed when the initial relative gauge angle between the two fragments is changed. In addition, the Josephson effect which induces a current between the two fragments has also been studied. Nevertheless, in nuclear reactions, the number of particles is small and initially fixed. Then to understand the results predicted by TDHFB it is necessary to restore the initial particle-number symmetries.

In this presentation, I will present, first, the result of the TDHFB calculation with a Gogny interaction for the reaction $20\text{O}+20\text{O}$ at different gauge angles. Then, I will discuss the effect of the gauge angle in a simple toy model, where we can compare the results of TDHFB with the exact solution.

The restoration of the gauge angle symmetry will be then studied with a projection method. This calculation consists in making several TDHFB calculations with different initial relative gauge angle. The final observable is then obtained by a triple projection method, that include the calculation of overlap between final state of the different TDHFB calculations. The Pfaffian method is used to compute the overlap between the quasiparticle vacuum states. The accuracy of this method is discussed in a simple model and then applied to the realistic model.

Serdecznie zapraszamy,

M. Kowal, W. Piechocki, L. Roszkowski, J. Skalski, L. Szymanowski