CENTRE D'ETUDES NUCLÉAIRES DE BORDEAUX-GRADIGNAN

Jeudi 26 Mars 2015

à

14H30

Un café sera servi à partir de 14h15

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Microscopic description of fission using dynamical theories

Description of fission remains a challenge for nuclear theory. Several ingredients have to be taken into account: tunneling effect, dissipation, non adiabatic process, superfluidity... A theoretical description of fission that take into account simultaneously all of those phenomena is, for now, impossible. In order to simplify the description of the fission process, we divide it into two phases, the first one consists of the crossing of the barrier and the second phase described the descent of the potential towards scission.

To describe the first phase, a method beyond WKB approximation is proposed. The evolution of the wave-function during the tunneling process is obtained using the complex absorption potential method. The resonance states are also calculated allowing long time description of the fission process. The lifetime as well as the fission path is computed and compared to the WKB approximation.

The second phase is described with the Time-dependent Hartree-Fock + BCS theory. Starting with a configuration after the barrier, the dynamics take into account the superfluidity, the dissipation and the non-adiabatic effects that are known to play an important role at the scission. The fission modes of the 258Fm nucleus are studied. The resulting fission fragment characteristics show a good agreement with experimental data. Quantum shell effects are shown to play a crucial role in the dynamics and formation of the fragments. The importance of quantum fluctuations beyond the independent particle/quasi-particle picture is underlined and qualitatively studied.

Salle des Séminaires du CENBG

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