

## **Project in nuclear-reaction theory: "Development of a model of nuclear reactions involving halo nuclei including explicitly core excitation"**

Halos are exotic nuclear structures found at the edge of the valley of stability. Unlike stable nuclei, they exhibit a large matter radius. This unusual size is due to one or two loosely bound nucleons, which decouple from the core of the nucleus and exhibit an extended and diffuse wave function. Being very short lived, halo nuclei are studied mostly through reactions. Although simple reaction models based on a few-body description of these nuclei provide a good description of the experimental cross sections, the dynamical excitation of the core during the reaction seem to affect some reactions. The nuclear-reaction group in Mainz has recently developed a model of halo nucleus based on a Cluster effect field theory, that includes core excitation. The goal of the research project is to implement this model in reaction codes to study accurately the influence this structure property has on cross sections.

Prerequisites are a good knowledge of non-relativistic quantum mechanics and basic notions of nuclear physics. Knowledge of quantum collision theory is a plus.