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Search for Tensor Interactions in Nuclear Beta Decay

Precision measurements in nuclear beta decay offer today a sensitive window to search for new physics beyond the standard electroweak model. The new physics signatures can be parametrized in terms of exotic phenomenological scalar and tensor interactions, which induce deviations on sensitive observables relative to their standard model predictions. In the past few years, it has been recognized that precision measurements in beta decay can be competitive with direct searches of new physics performed at particle colliders provided they address appropriate observables like for instance the full beta-energy spectrum. The long-term goal of this project is to perform the most precise measurement of the beta-energy spectrum in 6He decay in order to search for or constrain the presence of tensor type interactions.
Following the first experiments carried out at the National Superconducting Cyclotron Laboratory at Michigan State University, in the beta decay of 6He and 20F, we are performing measurements at the Grand Accélérateur National d'Ions Lourds (GANIL) with both, fast (50 MeV/nucleon) and slow (25 keV) beams of 6He. GANIL offers a unique opportunity since it is the only facility worldwide where both beam energies are available. The interest in using both energies resides in the associated systematic effects of the measurements, which have to be studied in great detail. A first measurement with the low energy beam has been carried out in 2021. This contribution will introduce the general context of the project, describe the improvements of the experimental setup and report the current status of the data analysis.

Scientific topic

Symmetries and Interactions

Author: KANAFANI, Mohamad

Presenter: KANAFANI, Mohamad

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