

Development of SpecMAT –active target surrounded with an array of scintillation detectors

mercredi 17 janvier 2018 17:45 (20 minutes)

The population of single-particle states to probe the evolution of shell closures in atomic nuclei is of great interest among research groups around the world. One of the most precise tools for the population of these states is transfer reactions. However, even nowadays with the-state-of-the-art detectors and modern nuclear radioactive ion beam facilities, precise identification of excited states in a nucleus far from stability via a transfer reaction remains a challenge for nuclear spectroscopy. SpecMAT is an active target –time projection chamber designed to overcome this challenge by an innovative combination of techniques that integrates particle energy measurements in a high magnetic field with gamma-ray spectroscopy. Thus, kinematics of the reaction can be reconstructed with the resolution of up to 100 keV from the energy of the ejectile charged particles energy. Gamma-ray resolution below 4 % at 662 keV gamma-line can be achieved from an array of scintillation detectors. Combination of both techniques in one detector gives full information about the population of excited states and their decay, information which was before only accessible by performing different experiments.

Recent progress in the development of the detector, results from the test of the components in a high static magnetic field as well as simulations in GEANT4 will be presented.

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