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Scintillation array development for the SpecMAT Active Target - Time Projection Chamber

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The SpecMAT Active Target will consist of a Time Projection Chamber (TPC) surrounded with a gamma-detection array. This detector will be used for studies of exotic isotopes produced via transfer reactions. In an active target, an inner volume is filled with a gas which functions as both a target and a detection medium. Interacting with the gas reaction products ionise the gas along their path. Under electric field ionised electrons are collected on a segmented charge sensitive plane and thus particle's trajectories can be reconstructed based on the collected charge. The first peculiarity of this detector is positioning in a magnetic field of up to 4T. Experiencing Lorentz force particles will move by spiral trajectories. This approach allows extracting particles energies based on a trajectory curvature. Secondly, the array of scintillation detectors will be used for gamma spectroscopy of populated states in transfer reactions for achieving a significant improvement in resolution.

GEANT4 simulations, prior detector design and results from several tests in high magnetic fields will be presented.

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