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Simulation and tracking algorithm of an Active Target Time Projection Chamber (AT-TPC) SAUL BECEIRO, WOLFGANG MITTIG, TAN AHN, DANIEL BAZIN, REMI BECQUET, ZBIGNIEW CHAJECKI, ADAM FRITSCH, BILL LYNCH, AIMEE SHORE, MALEK TAHAR, National Superconducting Cyclotron Laboratory (Michigan State University) — The AT-TPC is a new detector being made for studying low-energy reactions induced by secondary beams with high resolution and efficiency. In order to define the construction details, a robust tracking algorithm is needed. First, reaction tracks must be simulated realisticly, obtaining all kinematic observables. Our choice of micromegas as gas-amplifier implies a nonlinear response of the pad-signal with respect to position. A simulation was developed to perform the track reconstruction based on modeling the ionization track and the corresponding drift electrons through the AT-TPC. It takes into account the energy loss of ions in the gas target, the drift of the electrons, the detector's magnetic field, the electron amplification, and the response of the electronics. All the associated fluctuations are taken into account. To extract the physical variables Monte-Carlo simulation tracks are produced and then compared to track signals using a χ^2 minimization to obtain the best parameters for the track. The program was used to test different pad patterns for the micromegas electron amplification detector in order to find the optimum pad layout for the construction of the detector. The code was also used to analyse tracks produced by alpha particles from a source in a test-device

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