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Improved Method for Excitation Energy and Angle Reconstruction for Solenoidal Spectrometer

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We present a new calibration and reconstruction method for solenoidal spectrometers like HELIOS. By calibrating detector response with known states and applying an analytical inverse transformation based on relativistic kinematics, the method directly extracts excitation energies and scattering angles from measured data. This approach overcomes limitations of traditional projection methods at forward angles and enables real-time, accurate spectra and angular distributions. Its effectiveness is demonstrated with the 25Mg(d,p) reaction, showing improved precision and efficiency for nuclear reaction studies.

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