Analysis and Validation of Reconstruction Resolution for CLAS12[1]

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The CLAS12 detector at Jefferson Laboratory measures electron-nucleus scattering and requires a complex reconstruction code. The reconstruction resolution is extracted from the difference between the reconstructed trajectory of a particle and a true trajectory (from simulation) to understand and improve the CLAS12 performance. Events are simulated with the physics-based code *gemc* and reconstructed with the CLAS12 Common Tools. We then start at the reconstructed track vertex and swim a track with the known momentum before the simulation. A second track is swum from the same starting point with the reconstructed momentum. We take the difference between points where the two tracks intersect CLAS12 subsystems and fit the distributions to obtain the widths/resolutions for the observables x, y, z, θ, ϕ, and b (b is the distance between points where the tracks intersect the front face of the detector subsystems). We plot the resolutions versus the positions of the detector subsystems. As particles go through more layers of CLAS12, the reconstruction resolution increases. We also see that after a *gemc* upgrade to make the code more realistic, the resolutions increased by about 50% on average and were more consistent with measured data.