A. ALIKHANYAN National Laboratory

Test Beam Prototype Simulations

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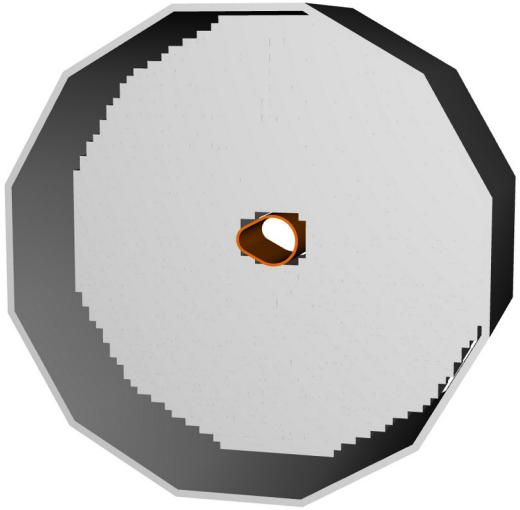
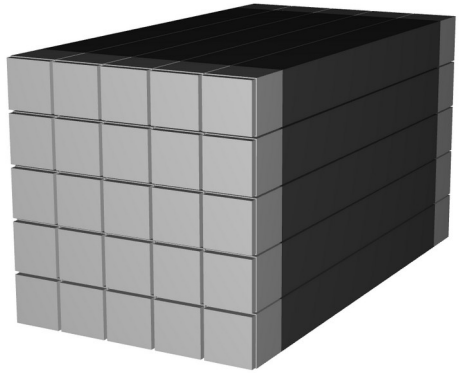
Simulation Setup

https://github.com/eic/epic/tree/main/build/epic_eeemcal_only.xml

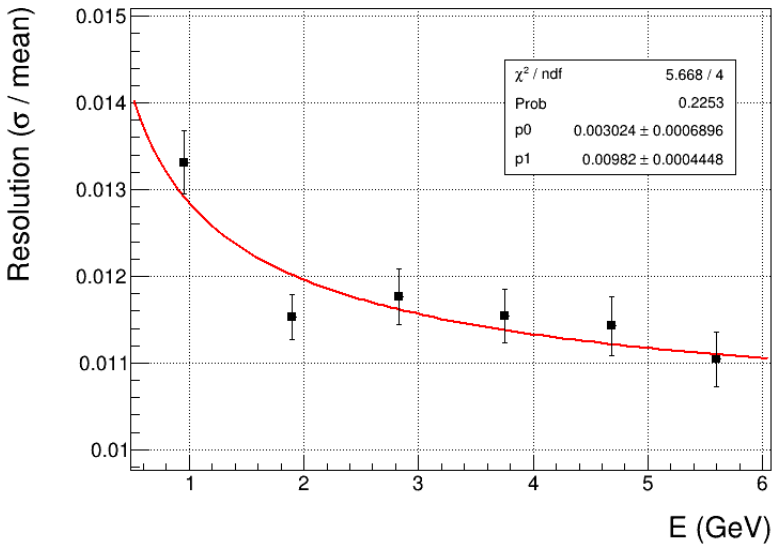


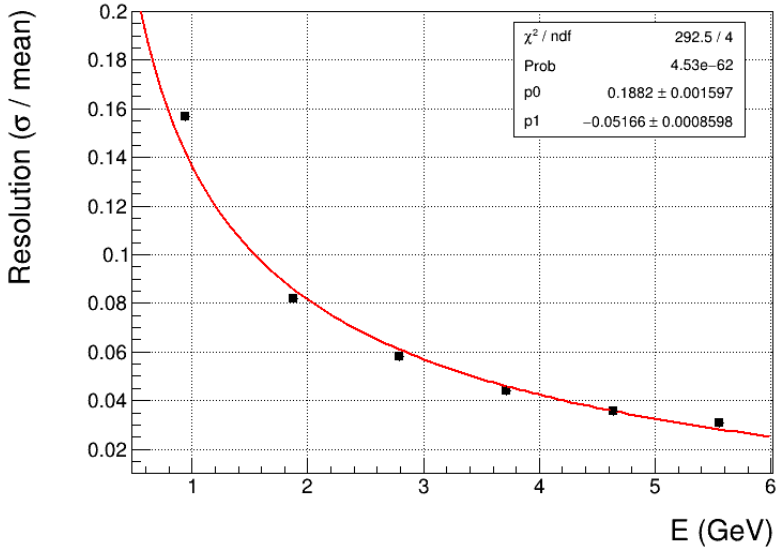
Prototype Simulations



Particle Gun
Position (0,0,-40mm)
Particle - e^-
Energies - 1,2,3,4,6 (Gev)
Energy Spread - 158 (MeV)

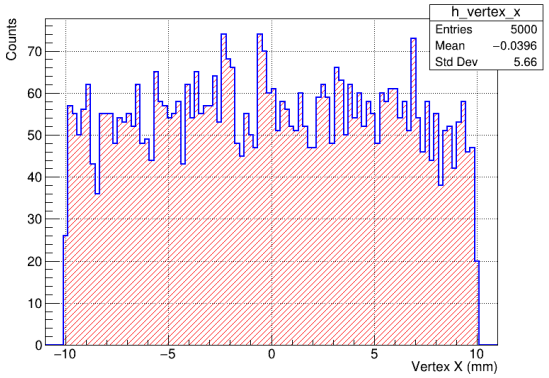
Energy Resolution for Mono vs DESY 5x5 matrices





Big effect for low energies

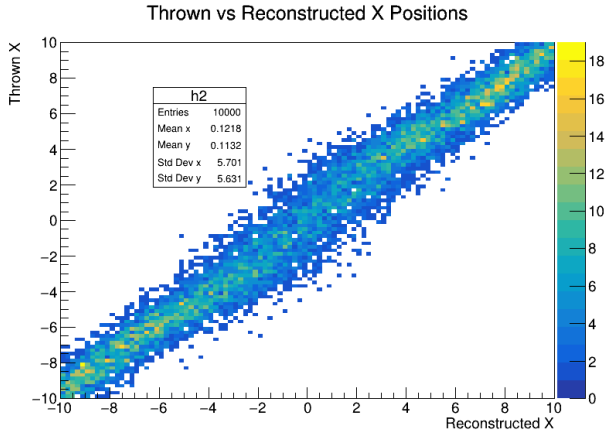
Position Resolution analysis

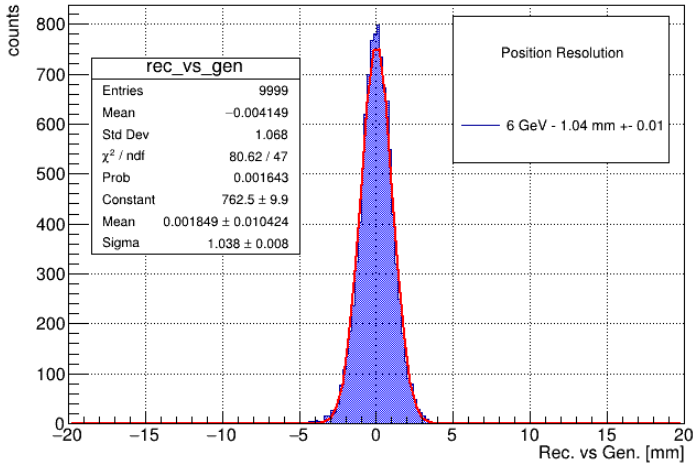


Uniformly distributed x coordinate over the width of central crystal

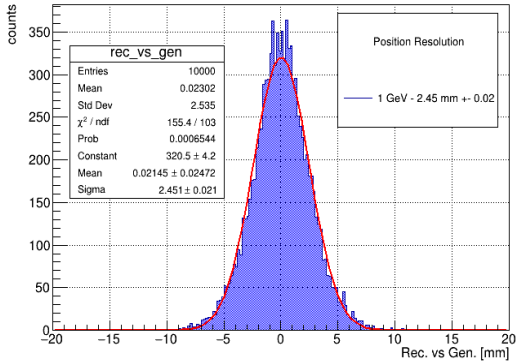
Logarithmic weights

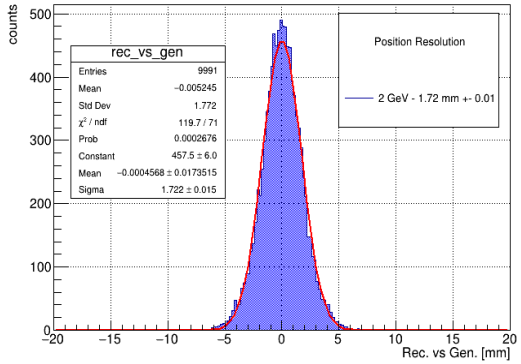
$$x = \frac{\sum_i w_i\, x_i}{\sum_i w_i} \qquad w_i = \max\left\{0, \left[W_0 + \ln\left(\frac{E_i}{E}\right)\right]\right\}$$

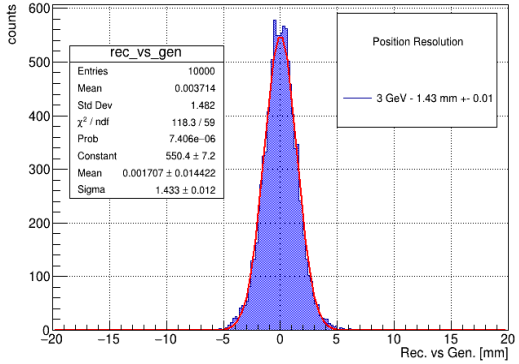


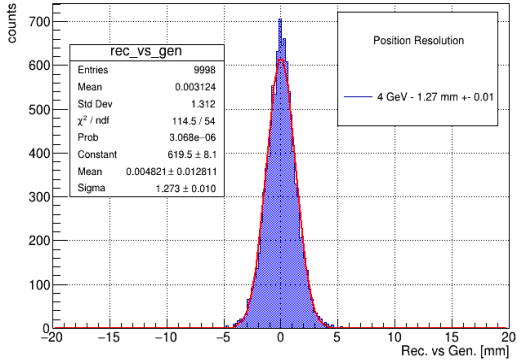


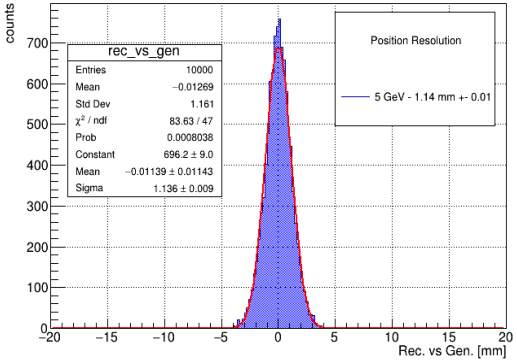
Position Resolution for Mono case

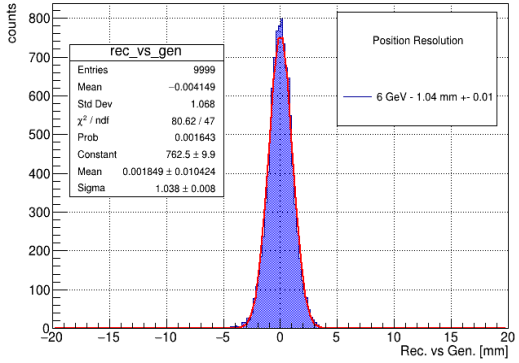






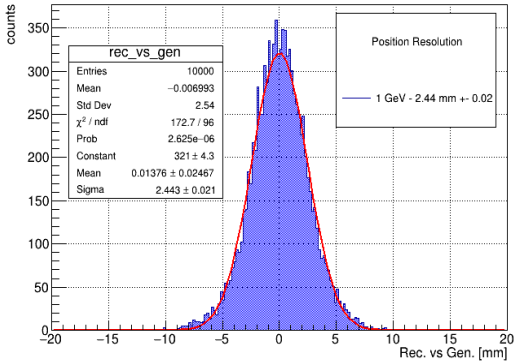


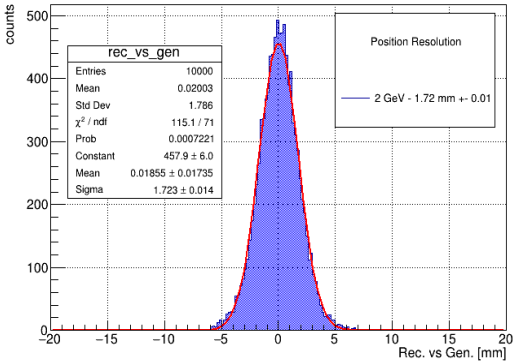


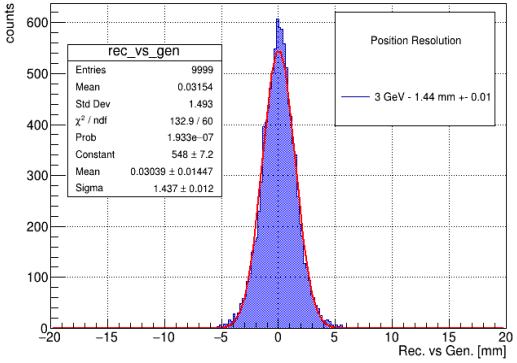


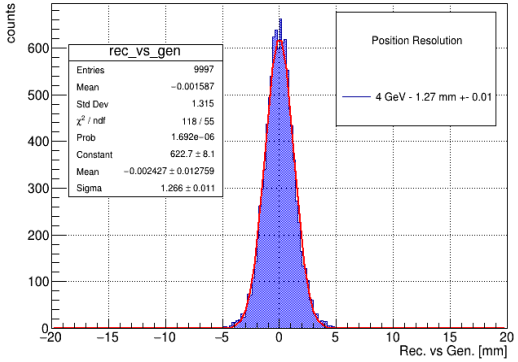
Position Resolution for DESY case (158 MeV spread)

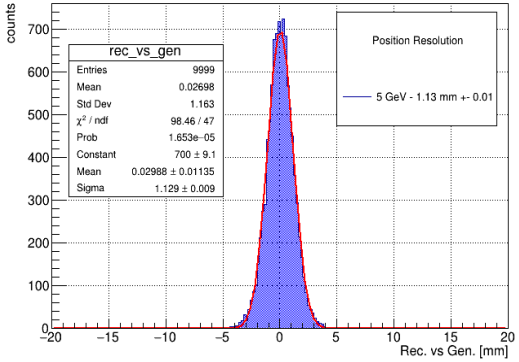
No difference found

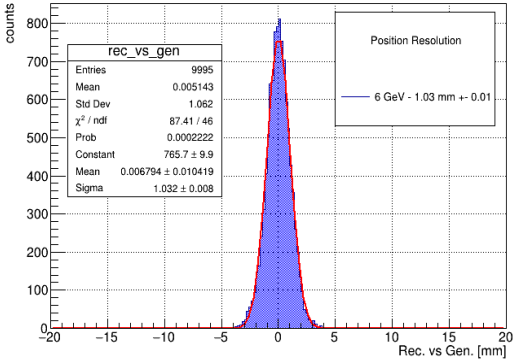




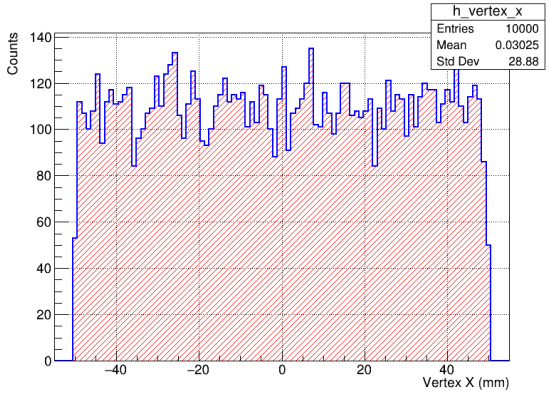








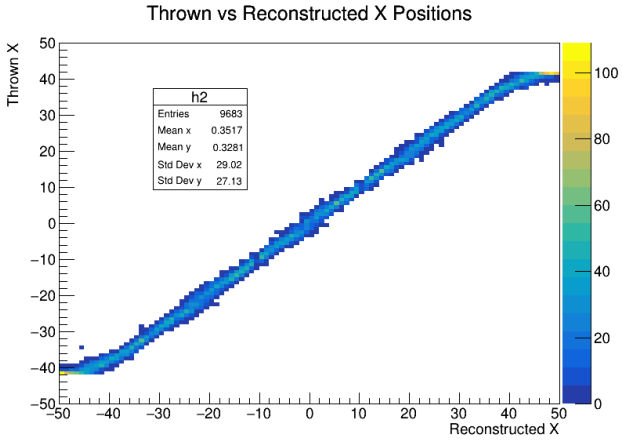
Position Resolution analysis

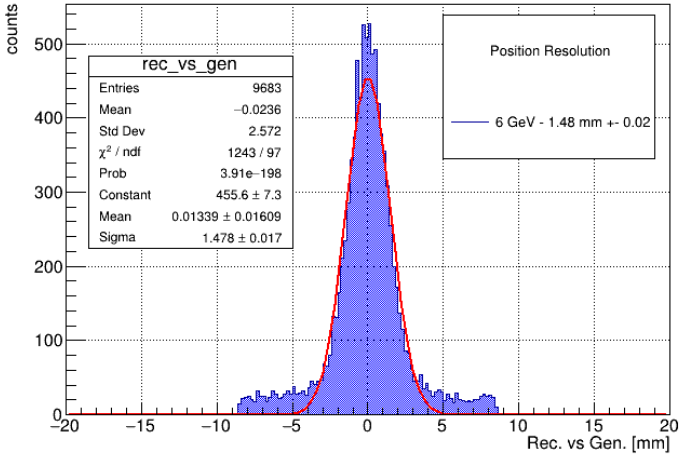


Uniformly distributed x coordinate over the width of all crystals

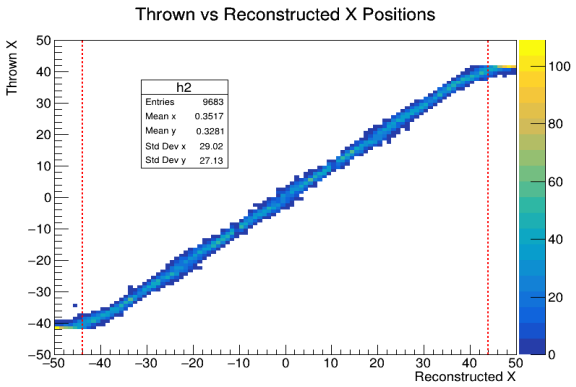
Logarithmic weights

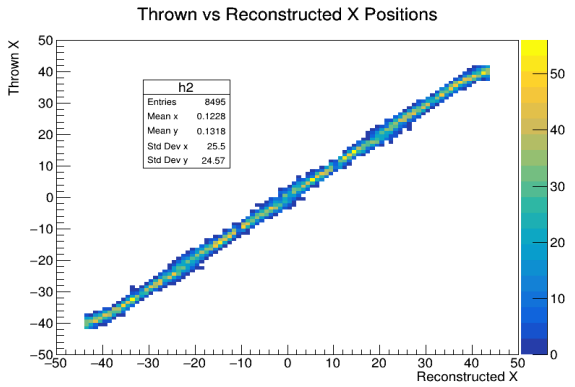
$$x = \frac{\sum_i w_i\, x_i}{\sum_i w_i} \qquad w_i = \max\left\{0, \left[W_0 + \ln\left(\frac{E_i}{E}\right)\right]\right\}$$

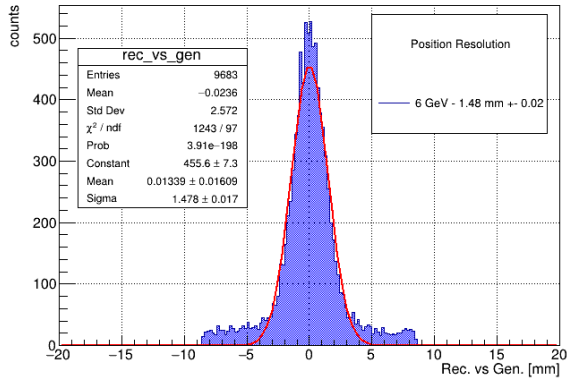


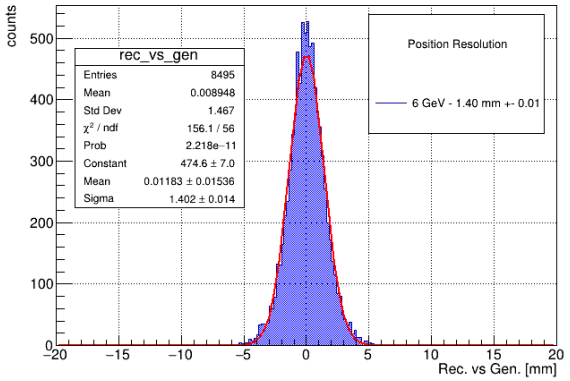


Position Resolution analysis



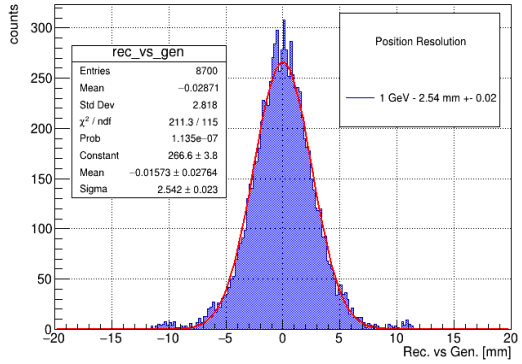


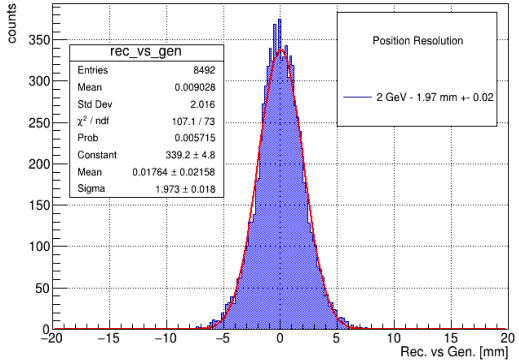


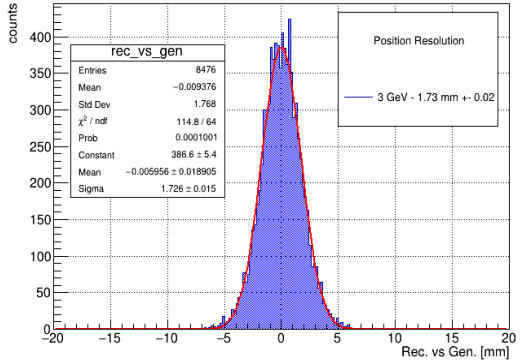


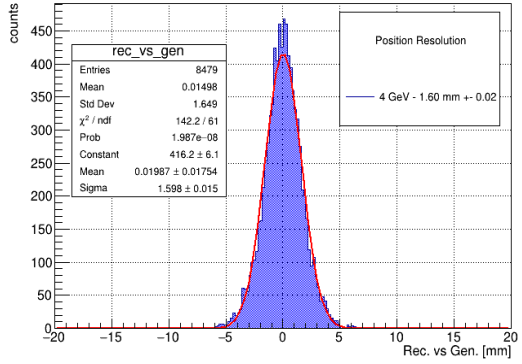
-44 mm to 44 mm
Thrown X Cut

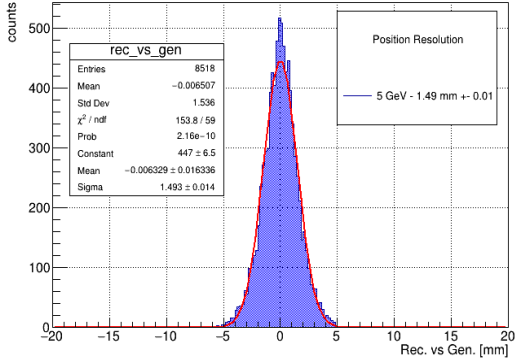
Position Resolution for Mono case

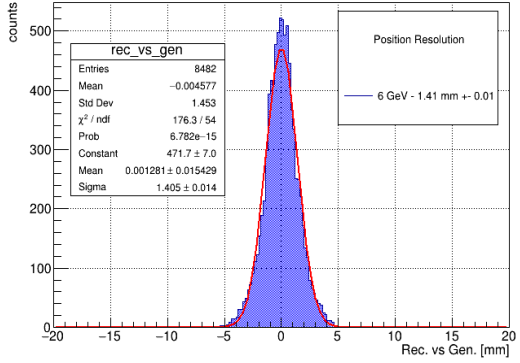




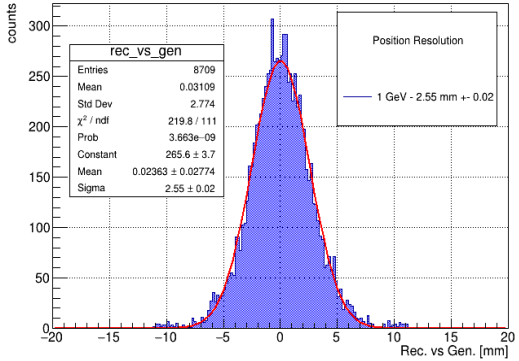


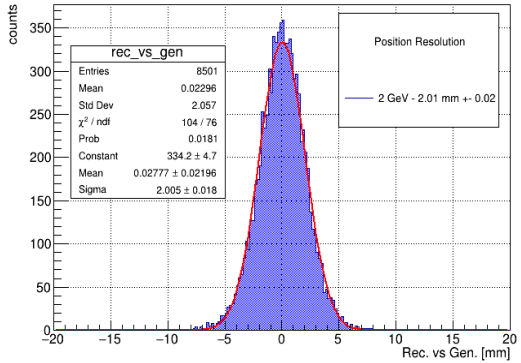


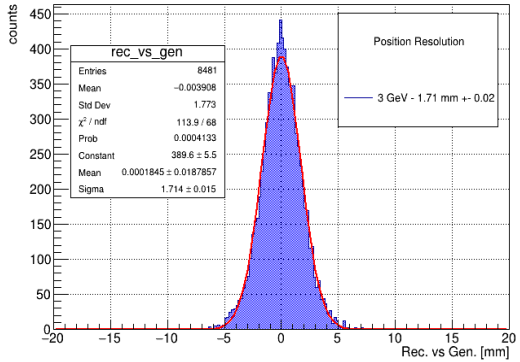


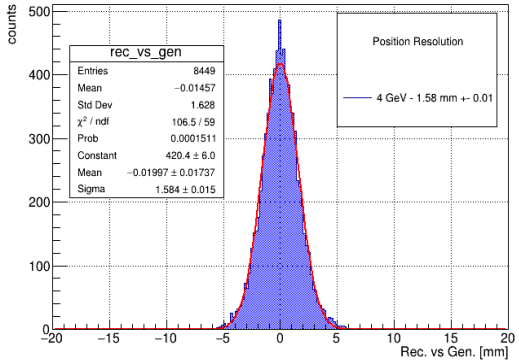


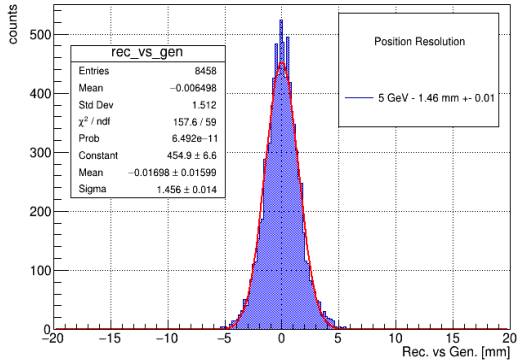
Position Resolution for DESY case (158 MeV spread)

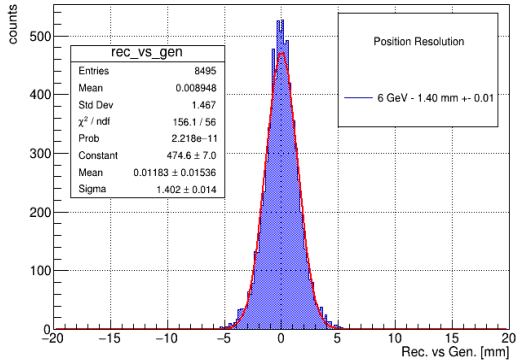




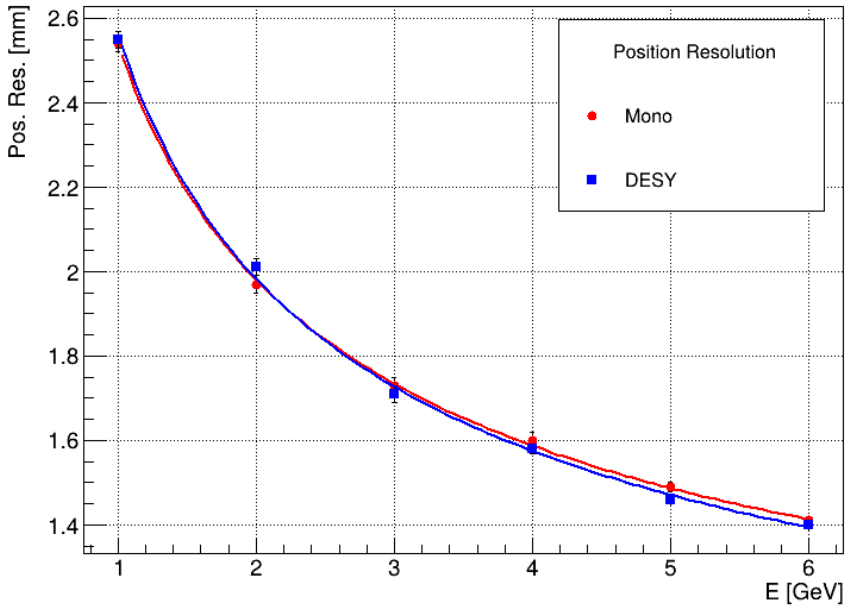








Position Resolution Comparison



No significant difference found