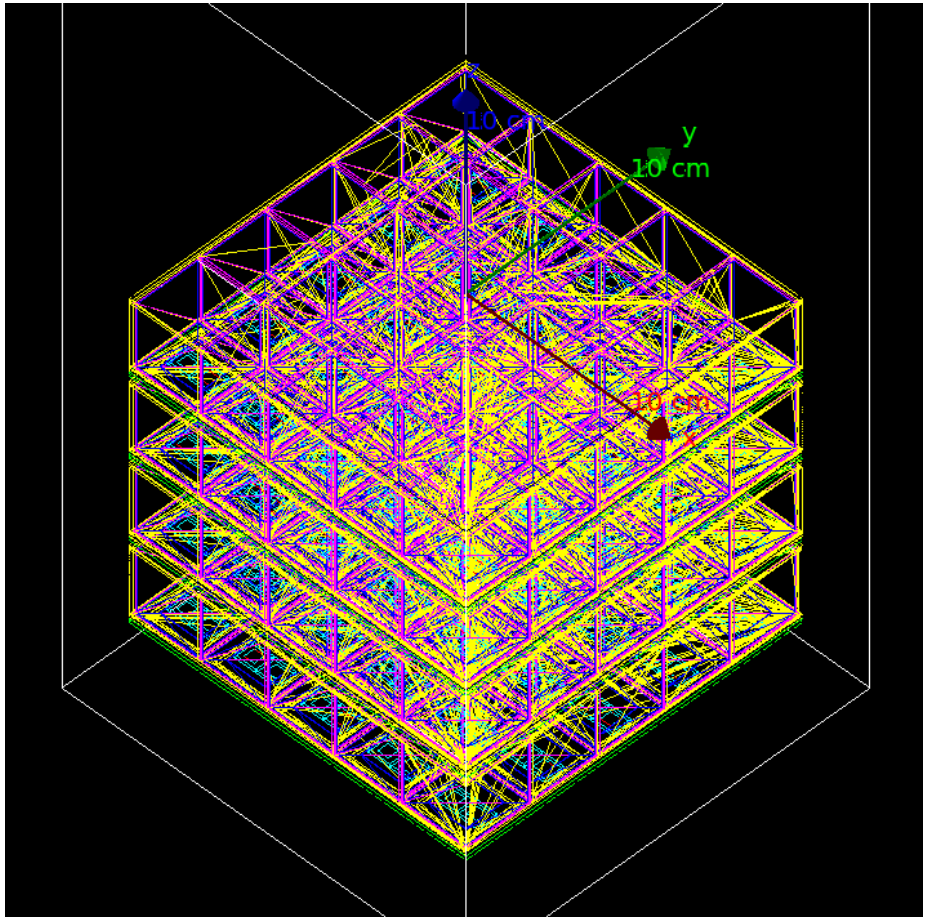
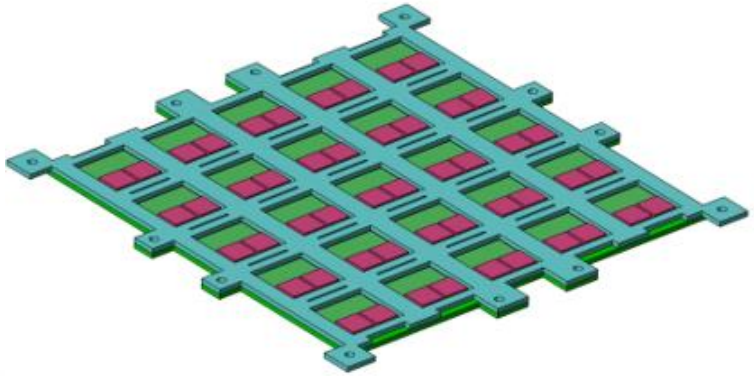
HEIC-Cube Geant4 simulation

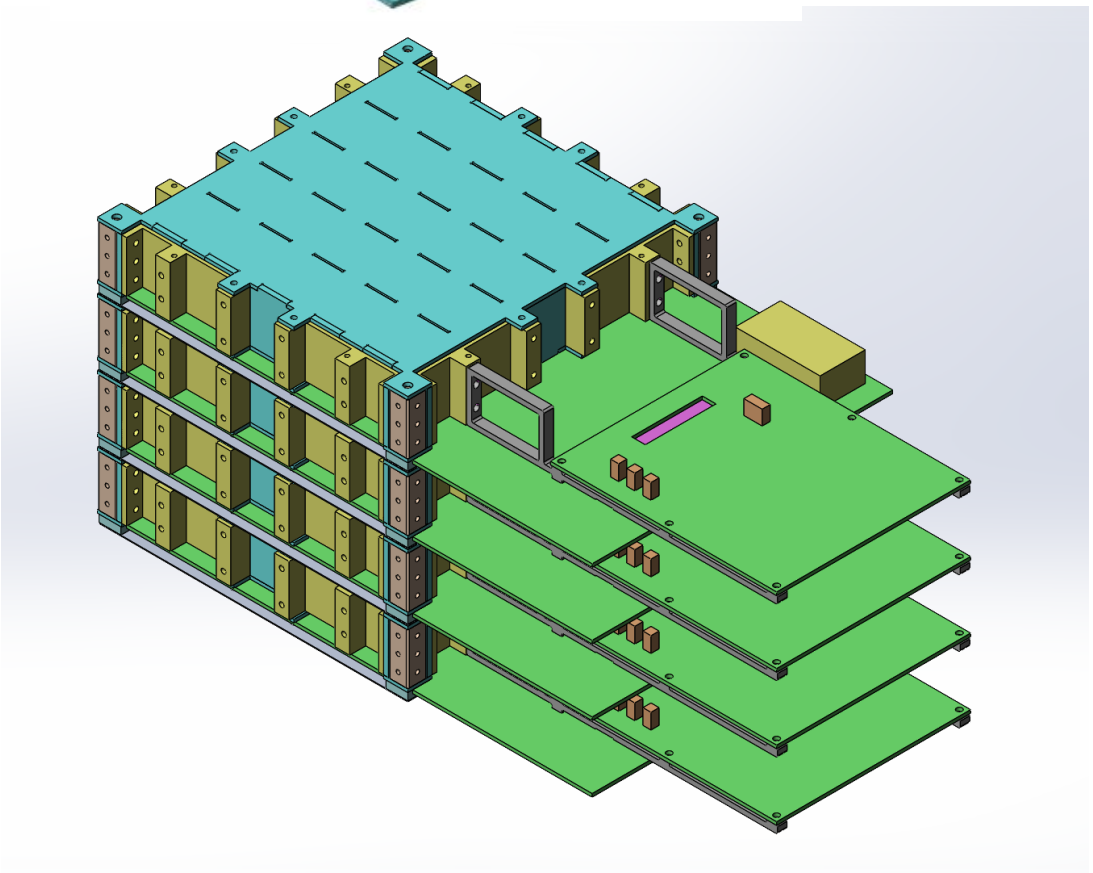
张研硕

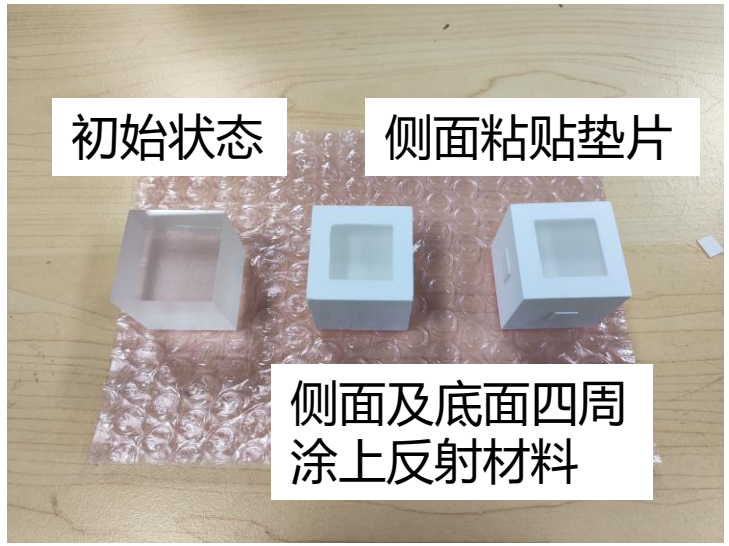
2024.01.04

Detector structure

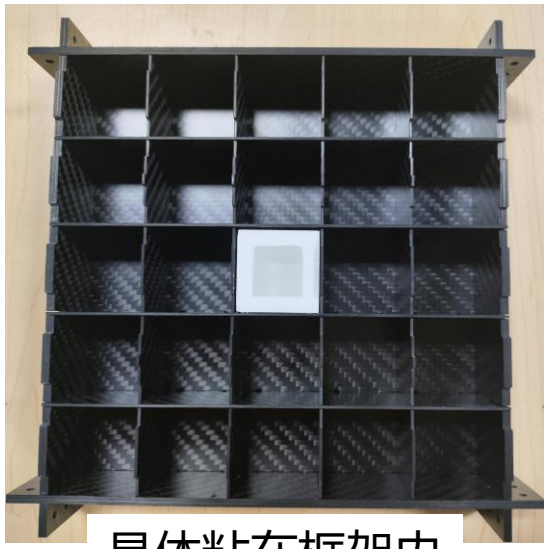




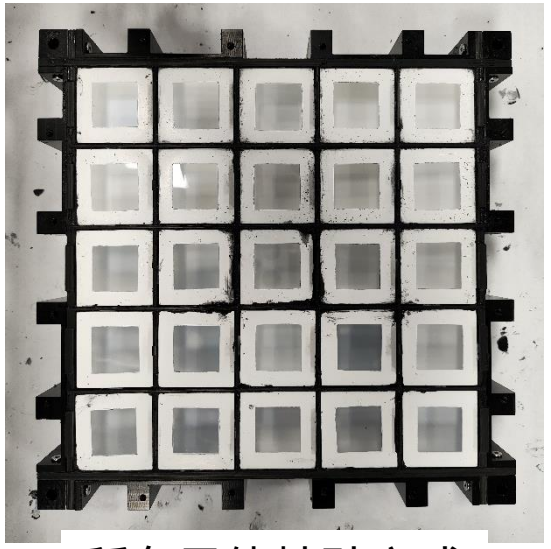




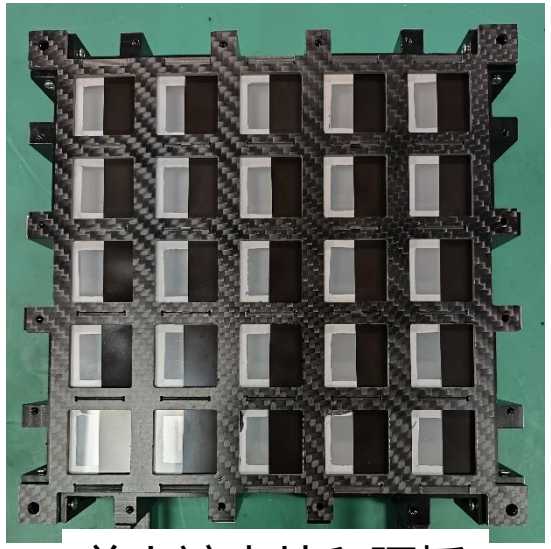
碳纤维框架



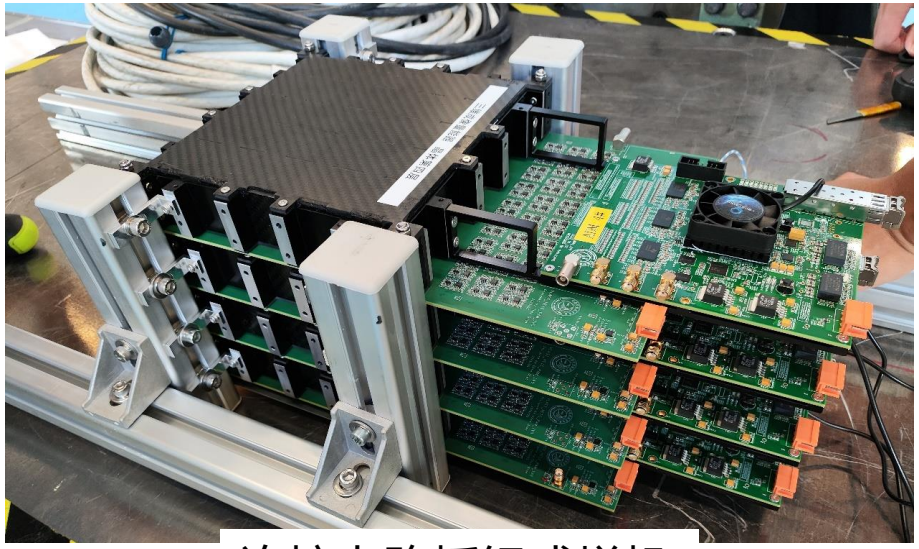
晶体粘在框架内



所有晶体粘贴完成

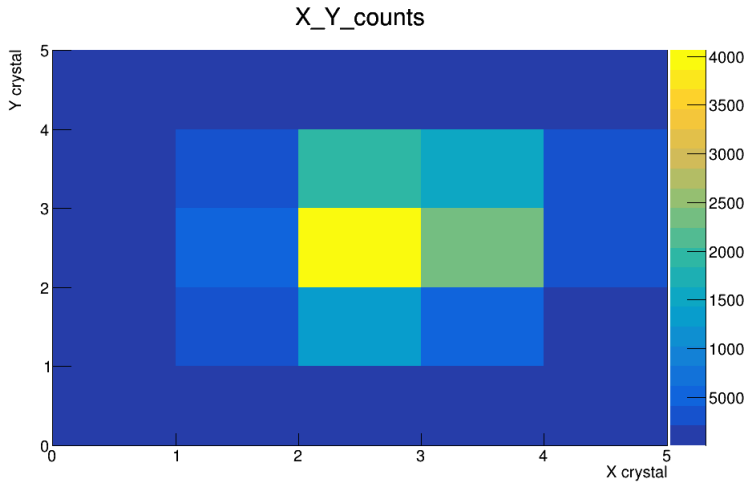


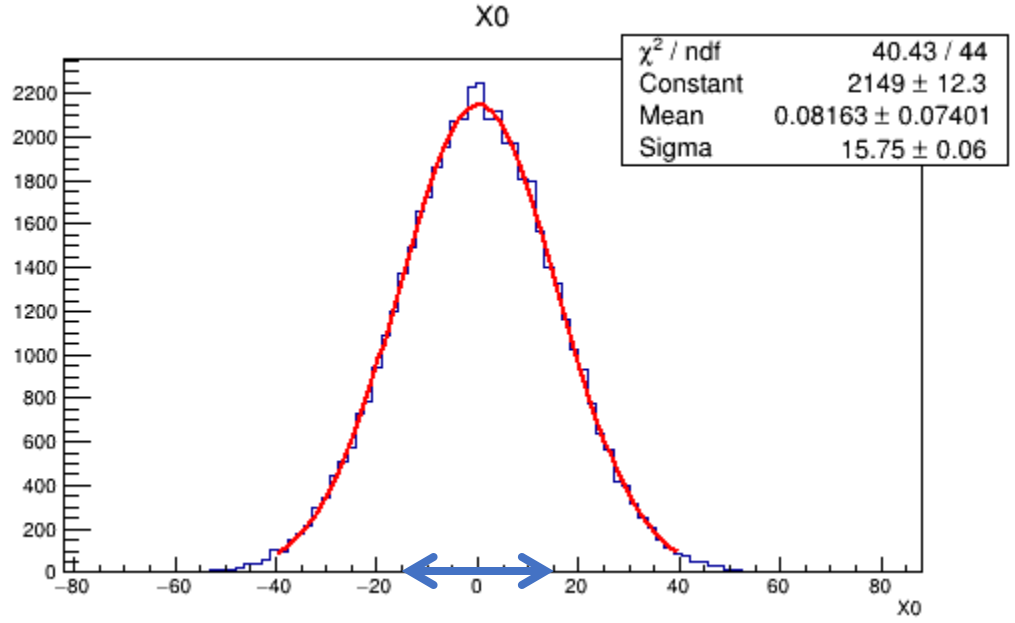
盖上遮光片和隔板

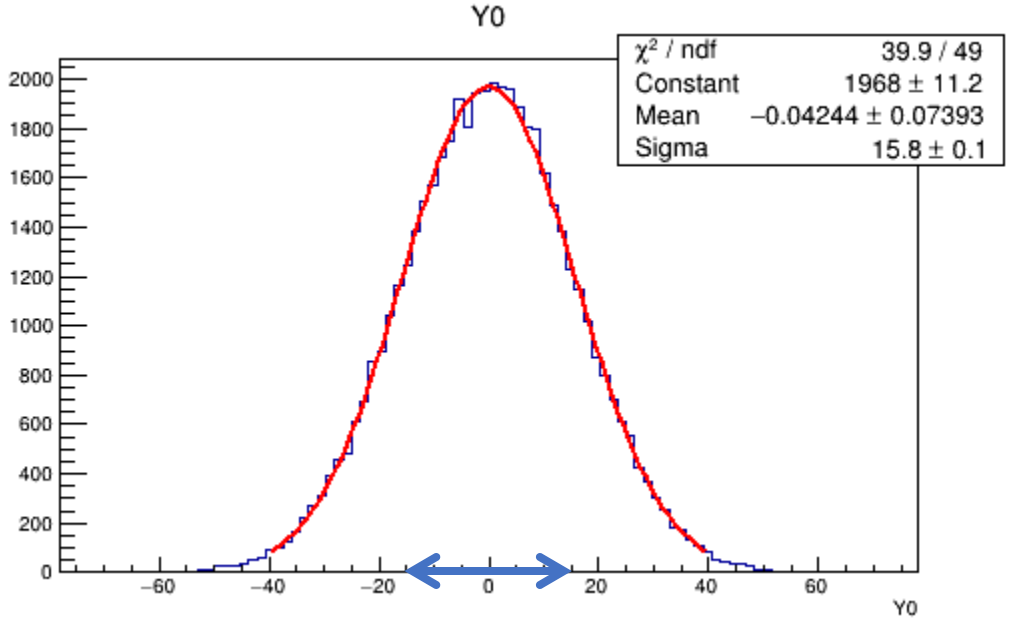


连接电路板组成样机

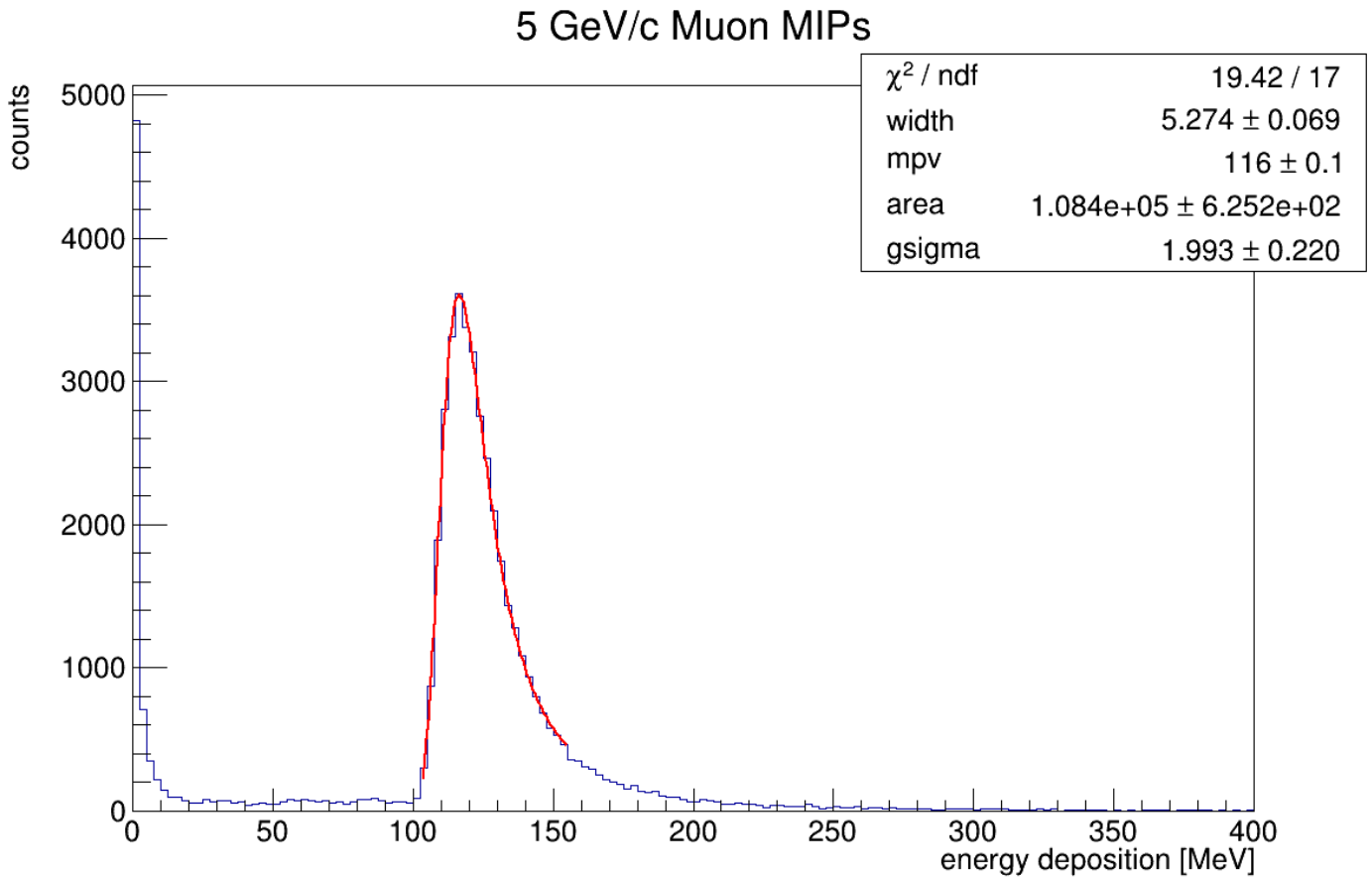
Particle source



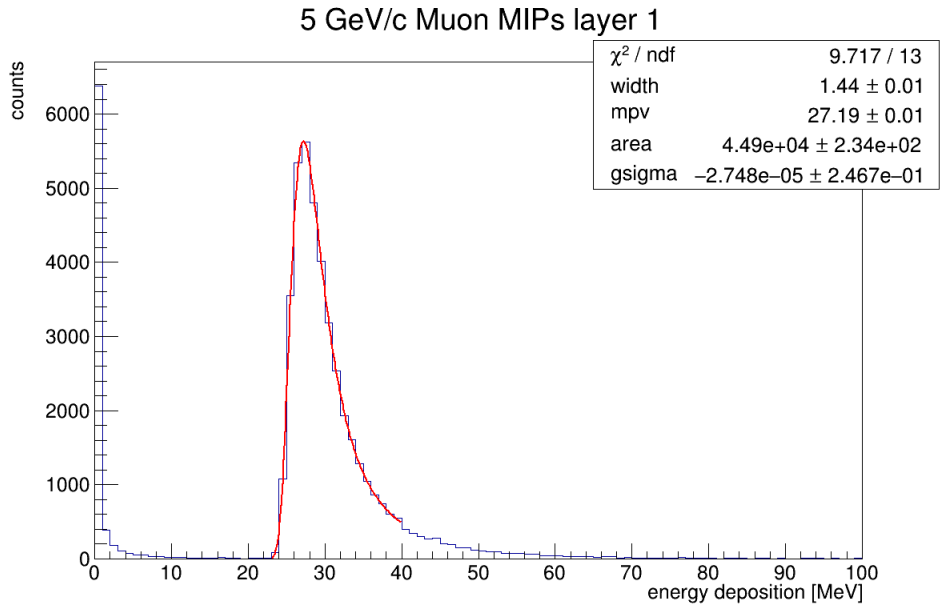


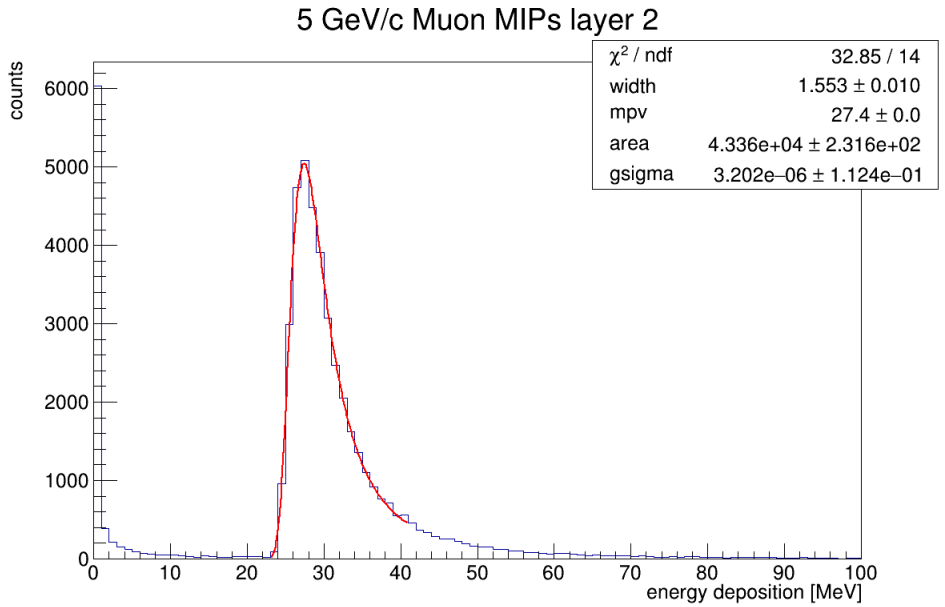


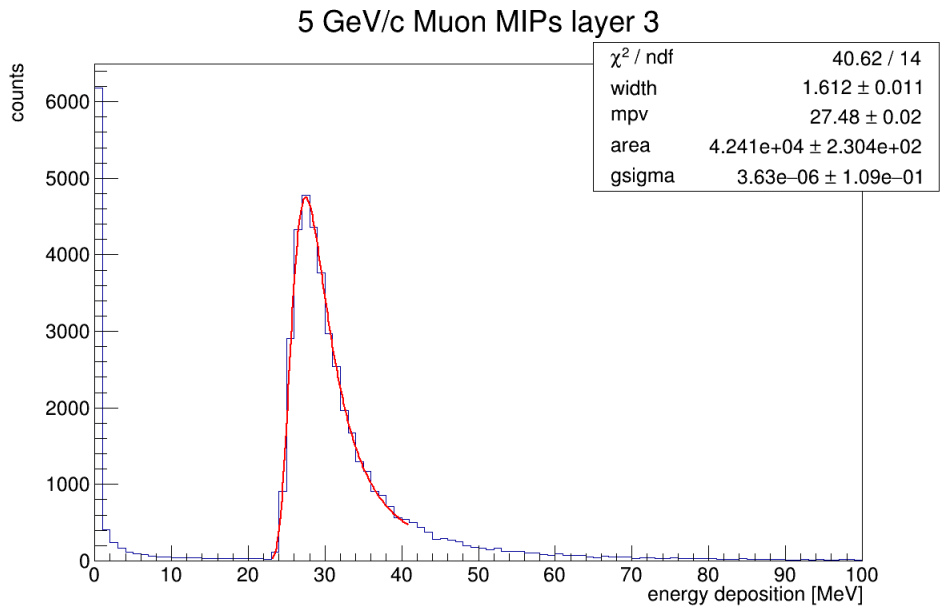
5 GeV/c Muon × 50000 events

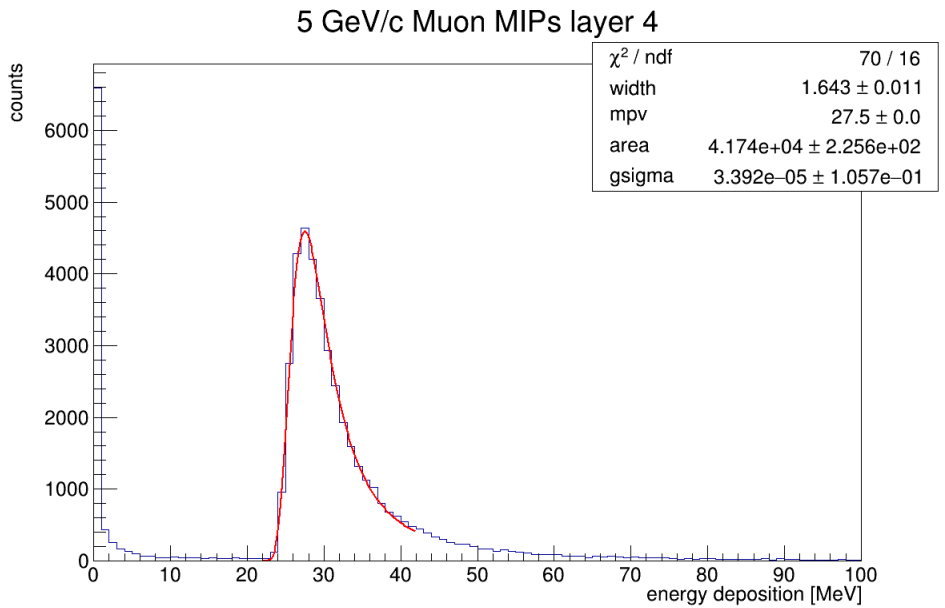


平均每层晶体内的能量沉积为 29 MeV





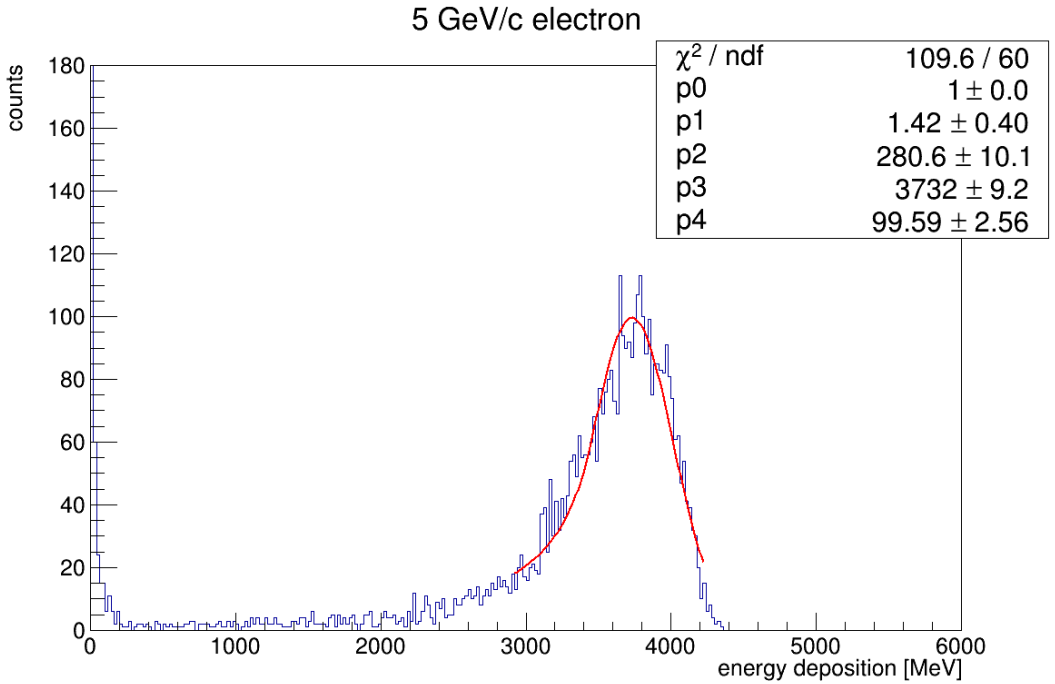




每层晶体的能量沉积为 27.5 MeV，与 DAMPE 的结果 23/25*30=27.6 MeV 保持一致

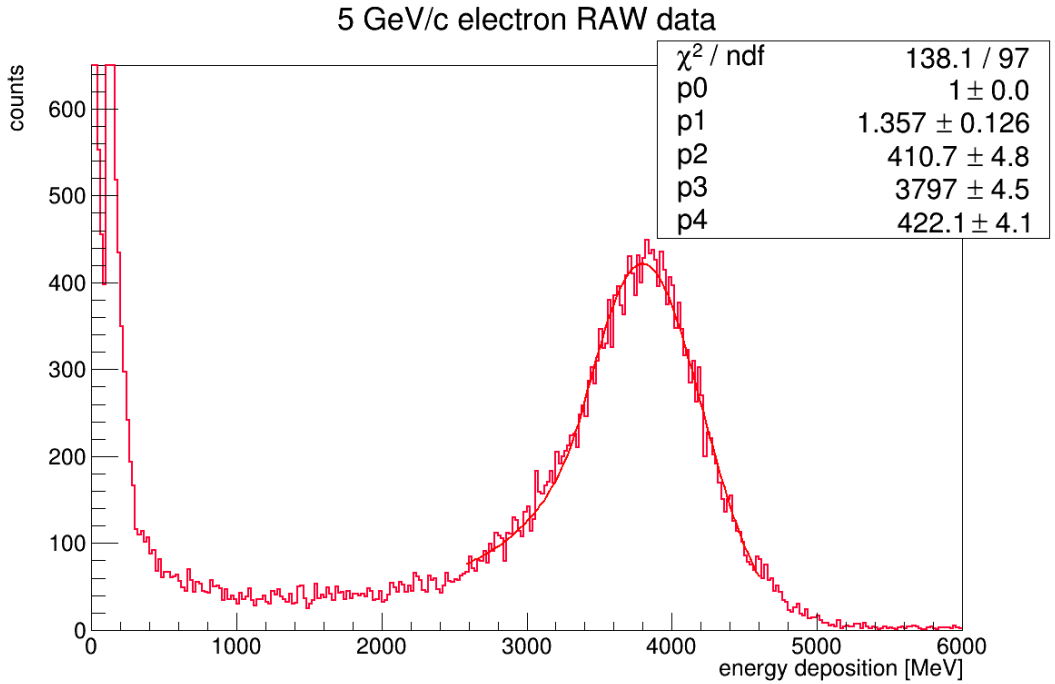
5 GeV/c Electron × 5000 events

Geant4 simulation



Energy resolution: 280.6/3732=7.52%

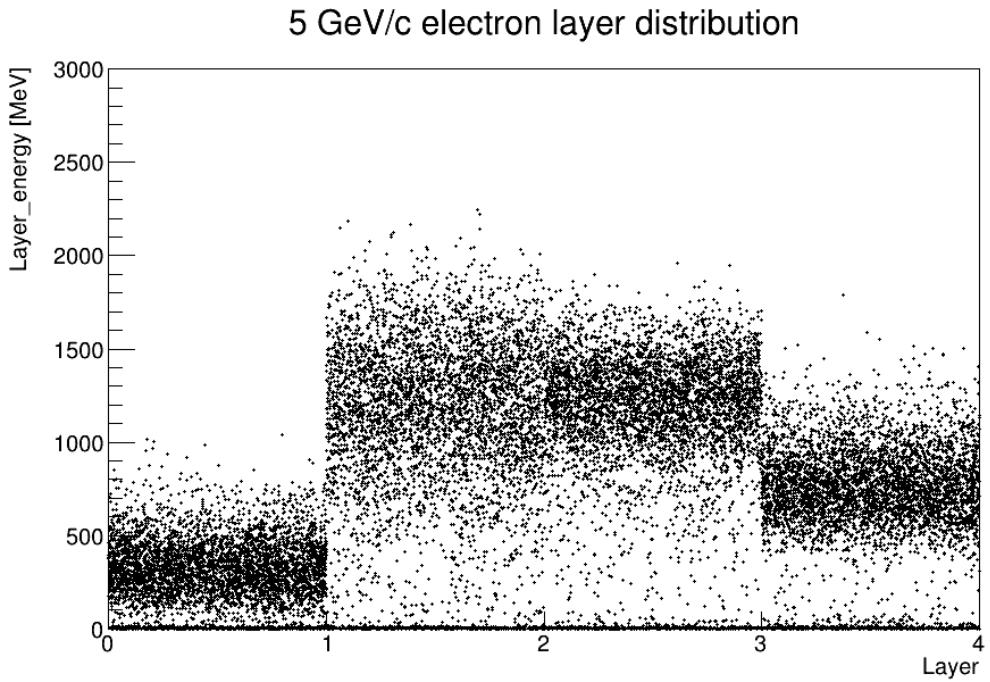
PS beam test data



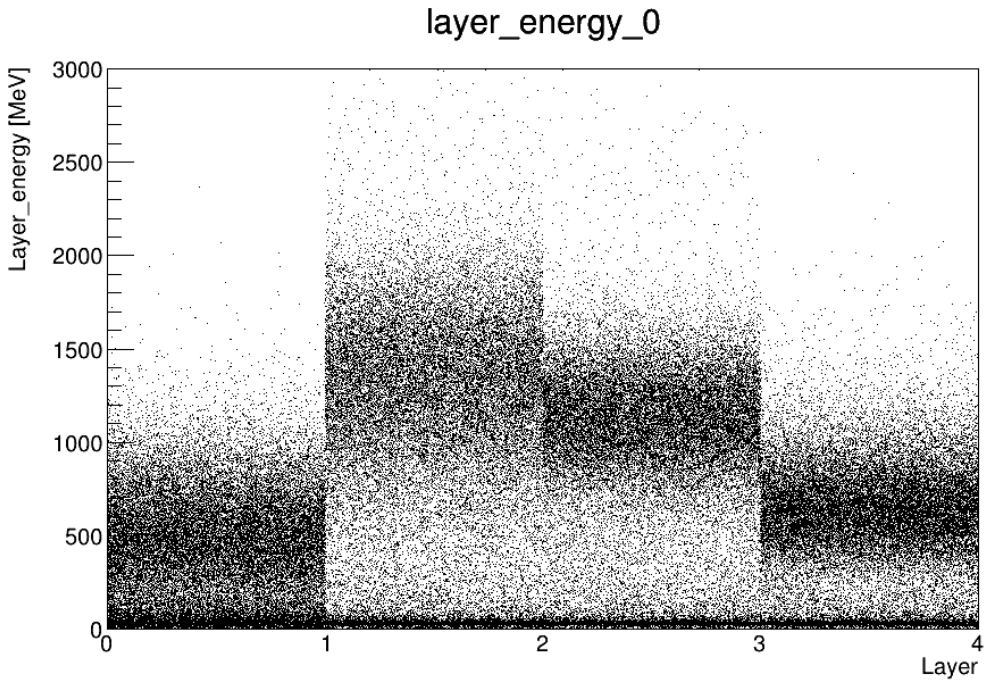
Energy resolution: 410.7/3797=10.82%

5 GeV/c Electron × 5000 events

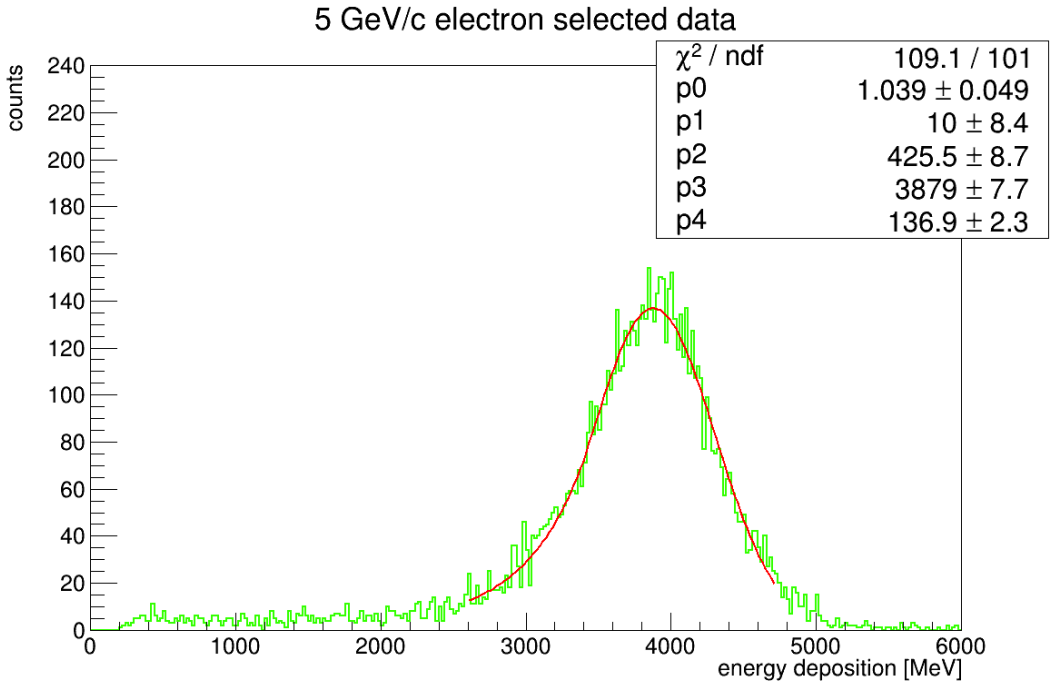
Geant4 simulation

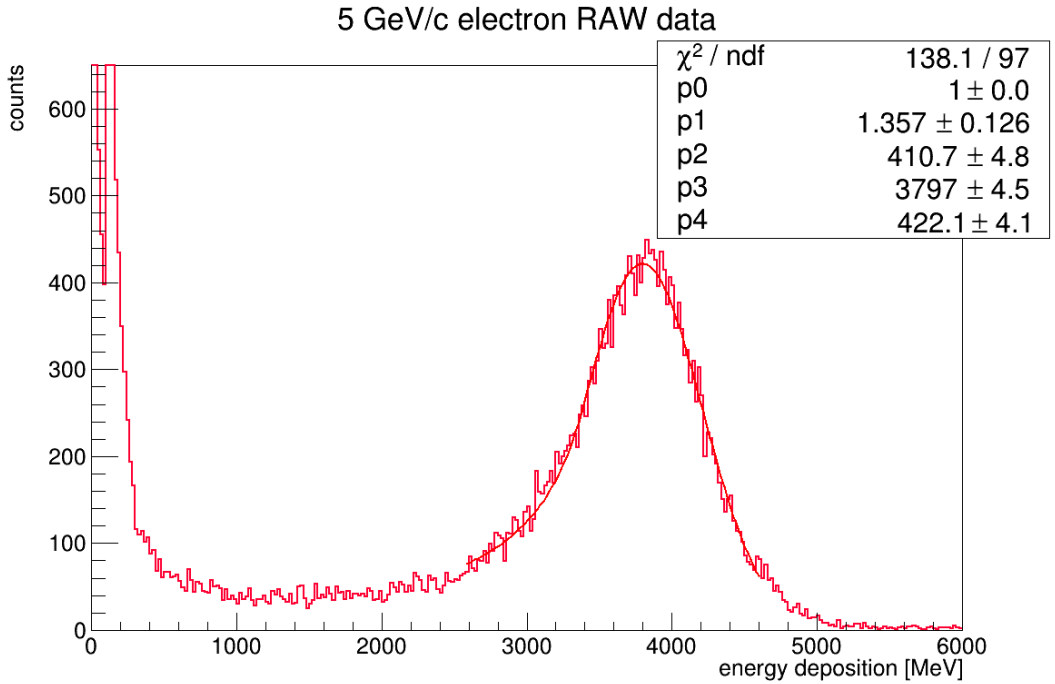


PS beam test data



PS beam test 5 GeV/c Electron data

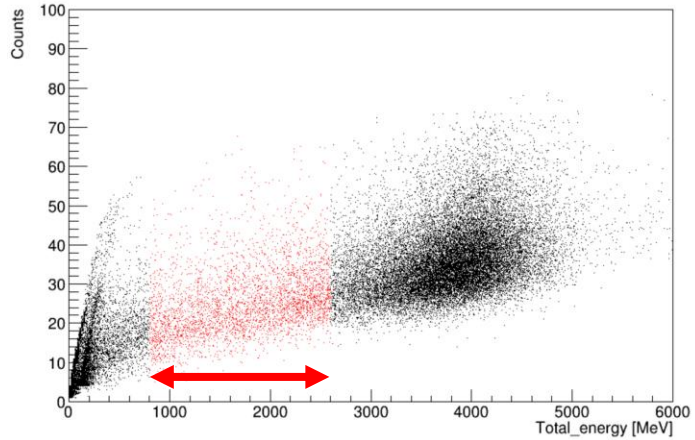




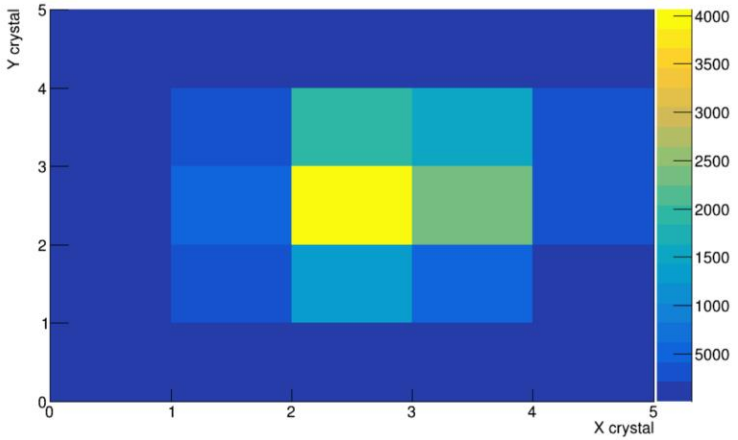
Energy resolution: 425.5/3879=10.97%

Energy resolution: 410.7/3797=10.82%

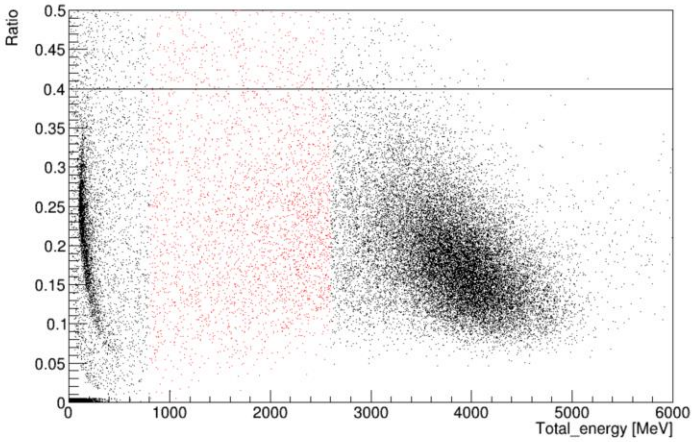
每个事例的击中数



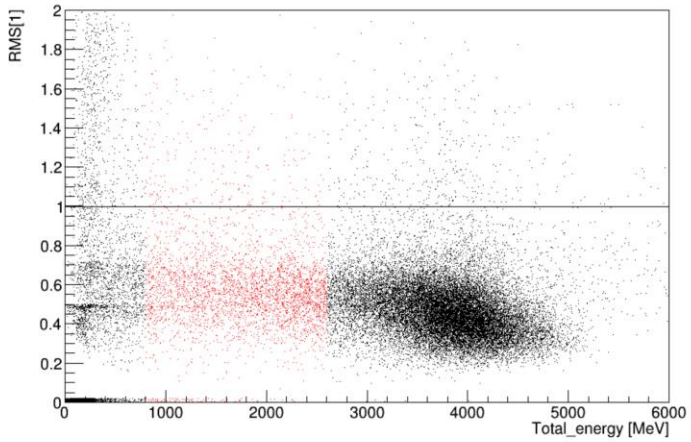
能量最大的晶体位置分布



最后一层的能量占比



第二层的 能量_位置 标准差



筛选条件和效率

selected condition	counts	ratio
(0) none	38180	100.00%
(1) layer>2 MIPs, layer>=3	29786	78.01%
(1)+(2) maxcell==crystal[12], layer>=3	8913	23.34%
(1)+(2)+(3) layer[3]/total<0.4	8682	22.74%
(1)+(2)+(3)+(4) RMS[1]<1	8631	22.61%

5 GeV/c 电子能谱