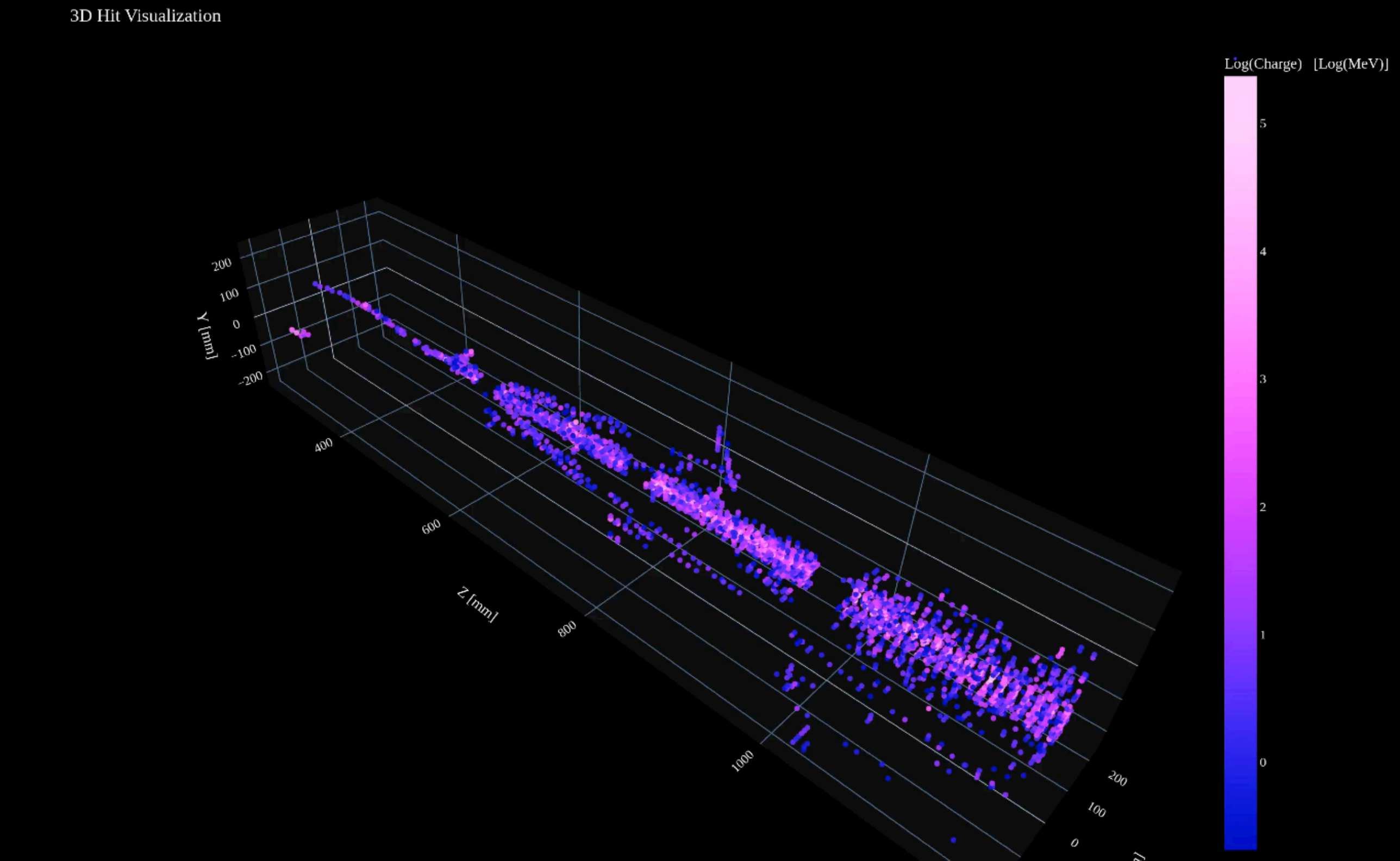
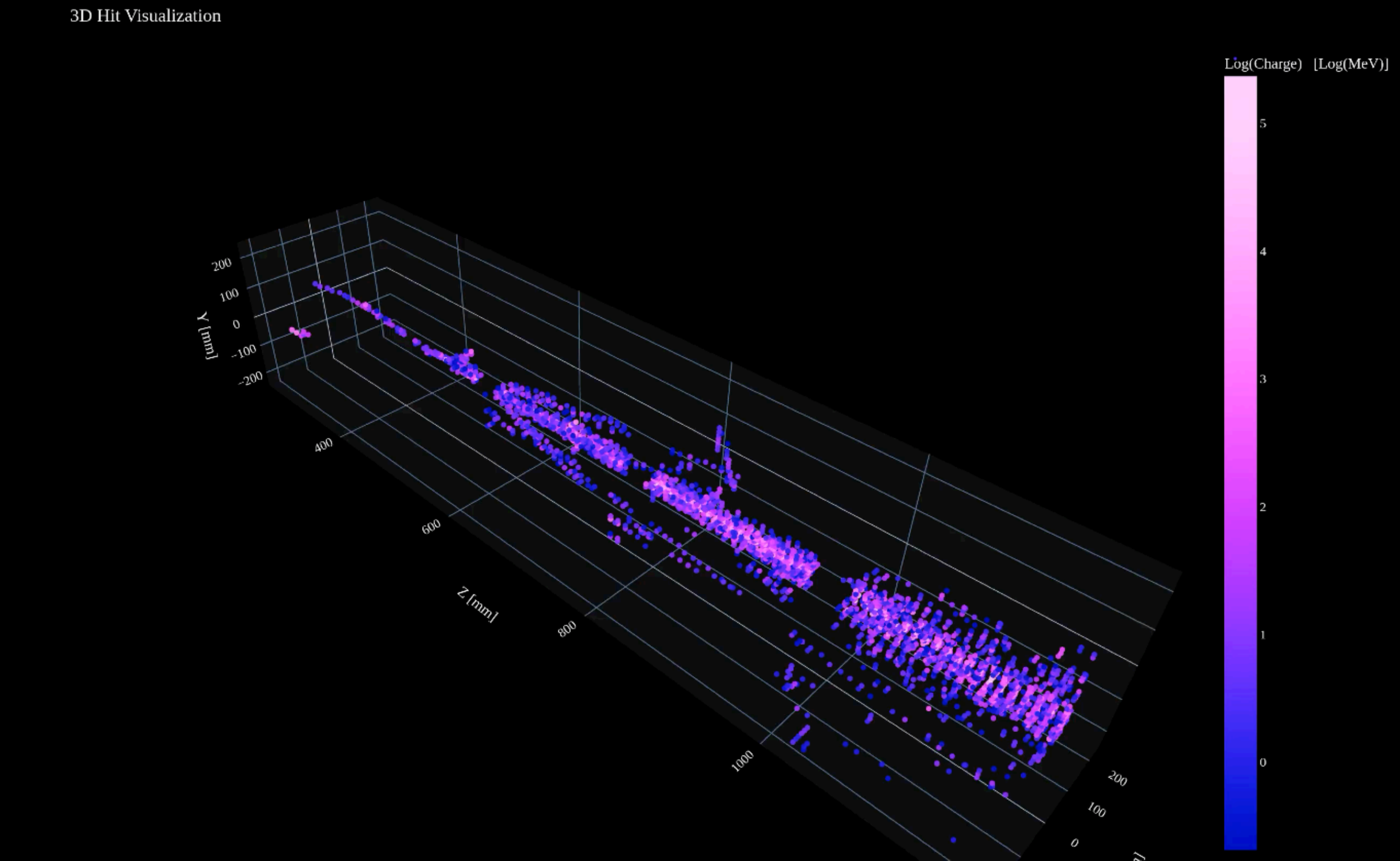
3D Hit Visualization

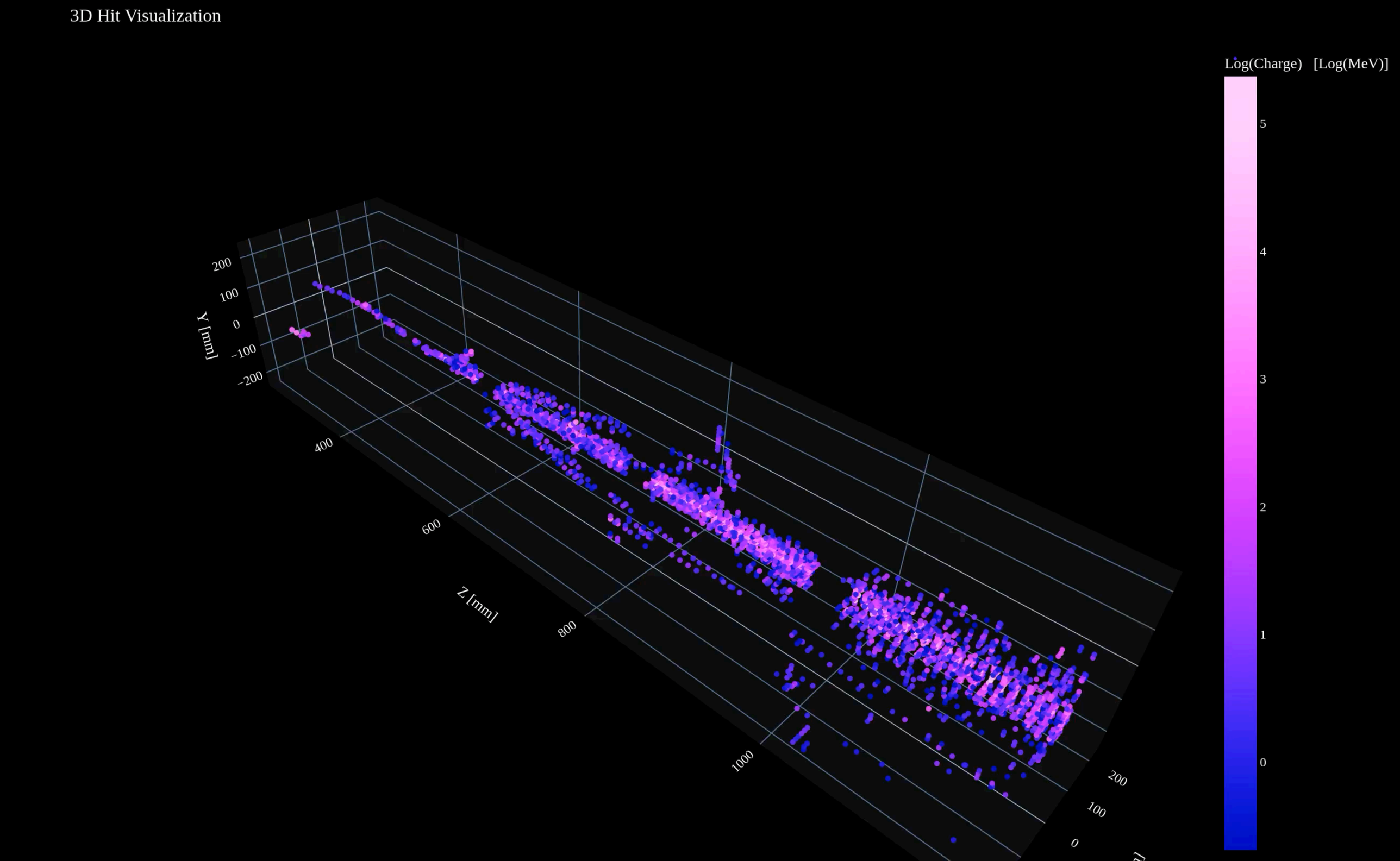


FASERCal

3D Hit Visualization



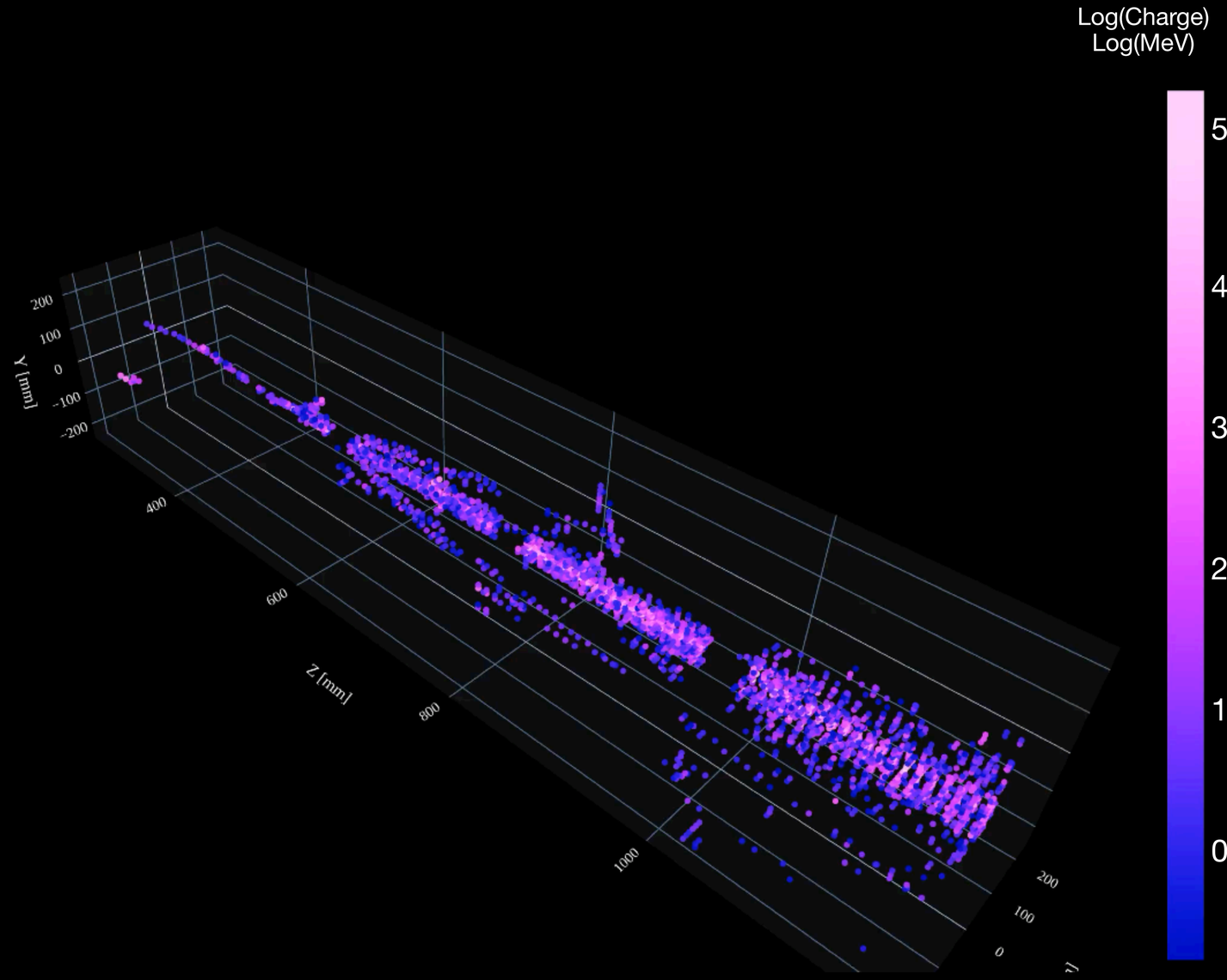
3D Hit Visualization



Event Display

FASERCal

- **Event Hits:**
  - Each point is a reconstructed voxel.
  - Detector volume is massive, but ~99% of voxels are empty.
  - *Energy patterns*: boosted forward, with complex and overlapping particle showers.
- **Goal:**
  - *Achieve full event reconstruction → classification and kinematics from this sparse data.*



Cool, but Why?

Neutrino Physics

Primary goal: *cross section measurements of different neutrino flavors at TeV energies.*

- **Electron neutrinos** ν_e
  - Gargamelle: up to 12 GeV.
  - E53 & DONuT: up to ~200 GeV.
  - No direct data above 250 GeV.

- **Muon neutrinos** ν_μ
  - Accelerator data: up to 360 GeV.
  - IceCube: above 6.3 TeV (large uncertainties).
  - Gap between 360 GeV – 6.3 TeV remains unexplored.

- **Tau neutrinos** ν_τ
  - Only 19 ν_τ CC interactions are directly observed.
  - Super-K, IceCube: oscillated ν_τ**:**
    - *relative appearance rates* and don't give precise cross-section constraints.
  - No measurements for E > 250 GeV.