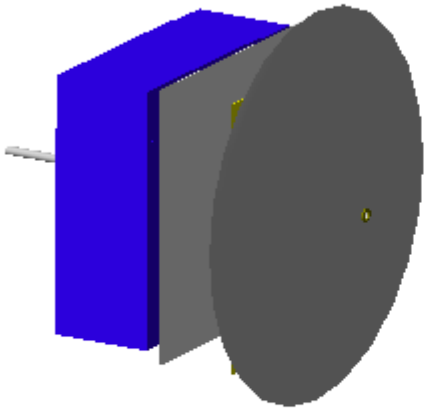
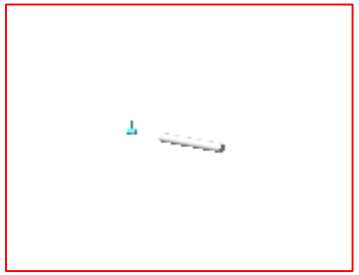
Collimator Simulation

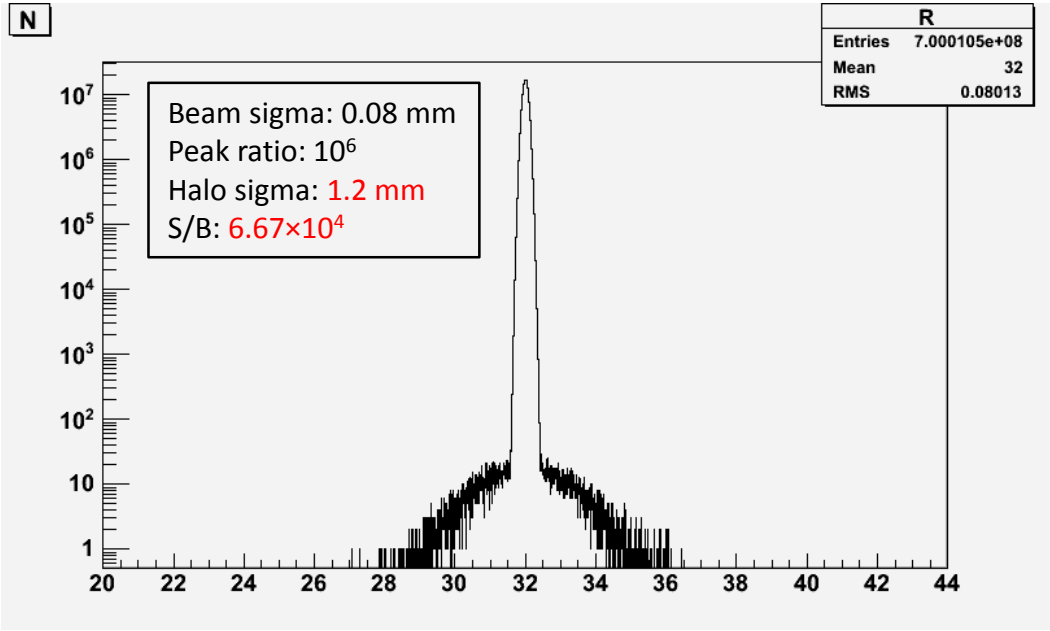
- 1 foot long, Nickel, ID: 4.8 mm, 6.4 mm, 8.6 mm
- Upstream of target cell

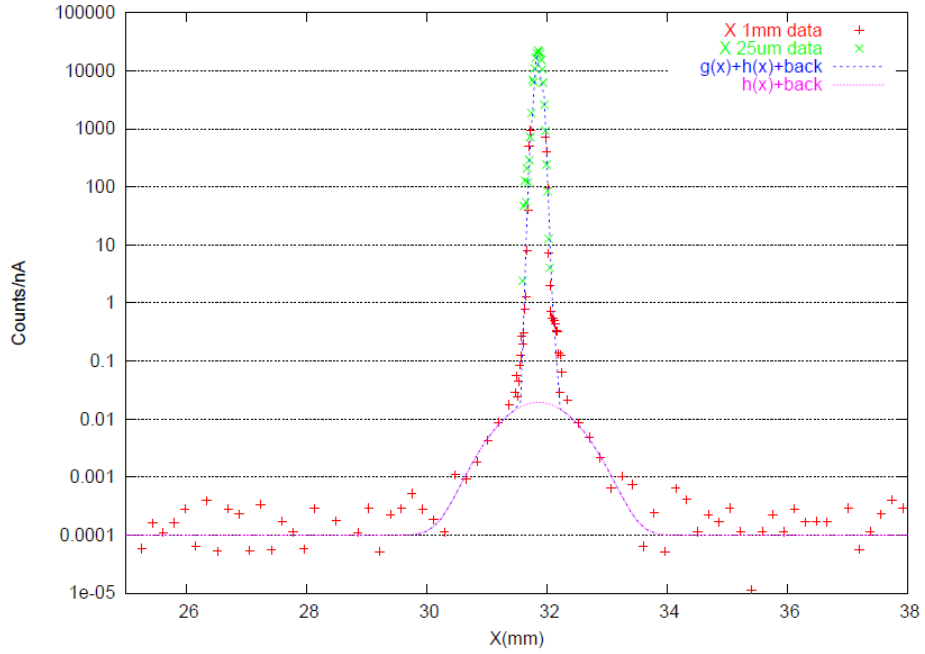




Previous simulation

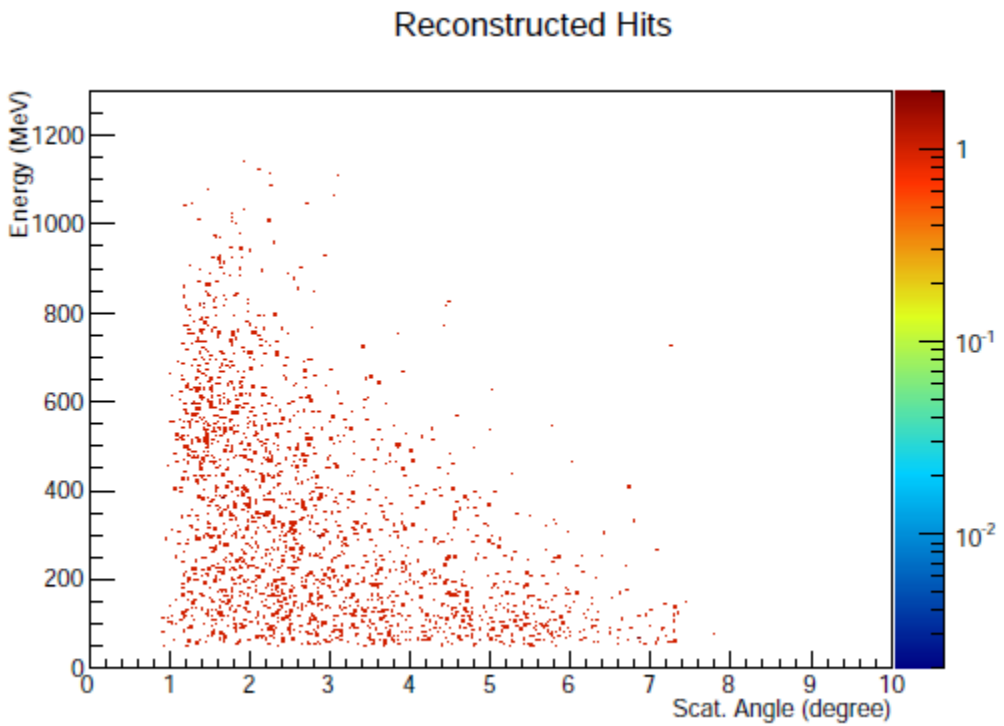
- Gaussian shape halo, conservative assumption: 1.2 mm
- Cell: 24 mm diameter, 4 mm aperture
- Triggered events for cell only: 17 (207 hits) over 10.67 sec, rates: 1.7

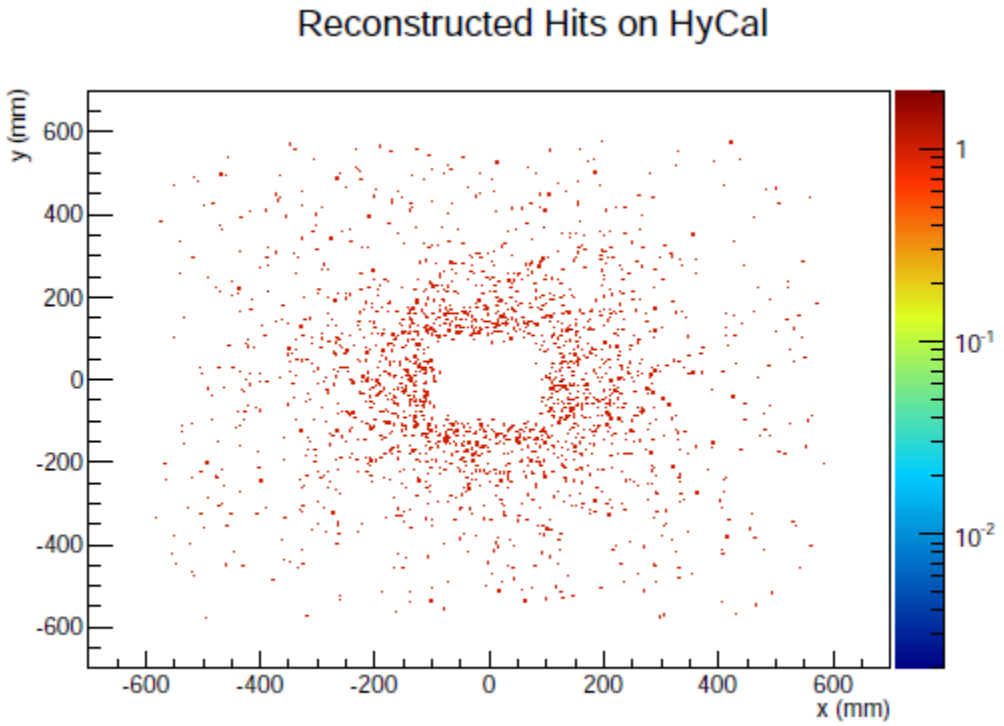




Simulation result

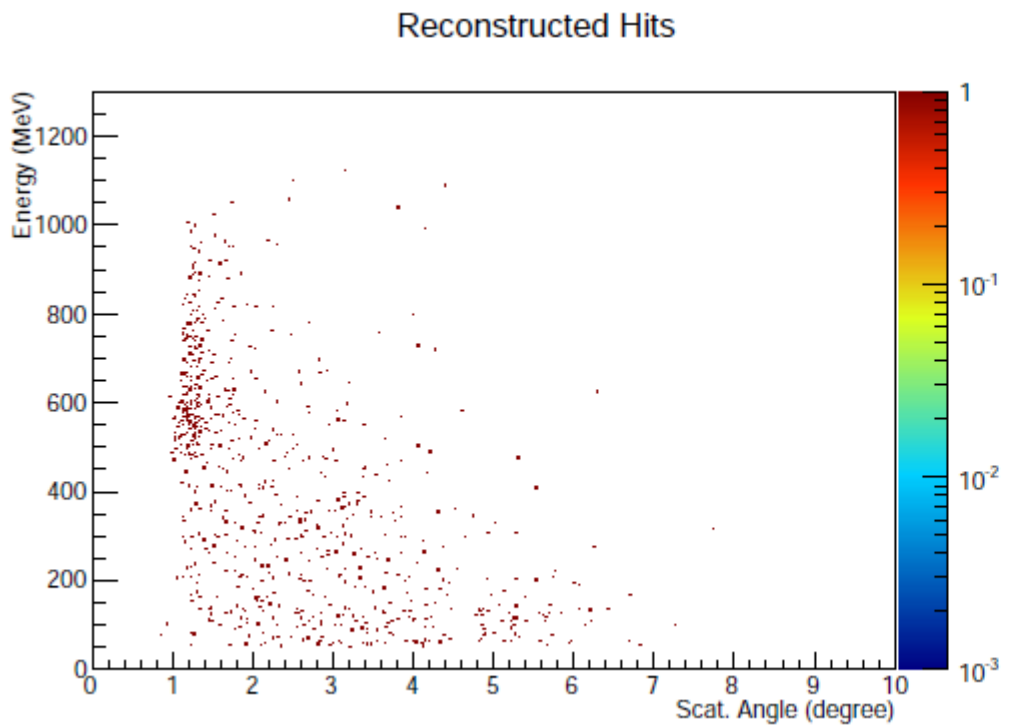
- ID: 4.8 mm, halo electrons 10^7 (10.67 sec)
- Trigger: Energy sum > 500 MeV (for 1.1 GeV beam)
- Triggered events: 1726, rates: 167.8 Hz

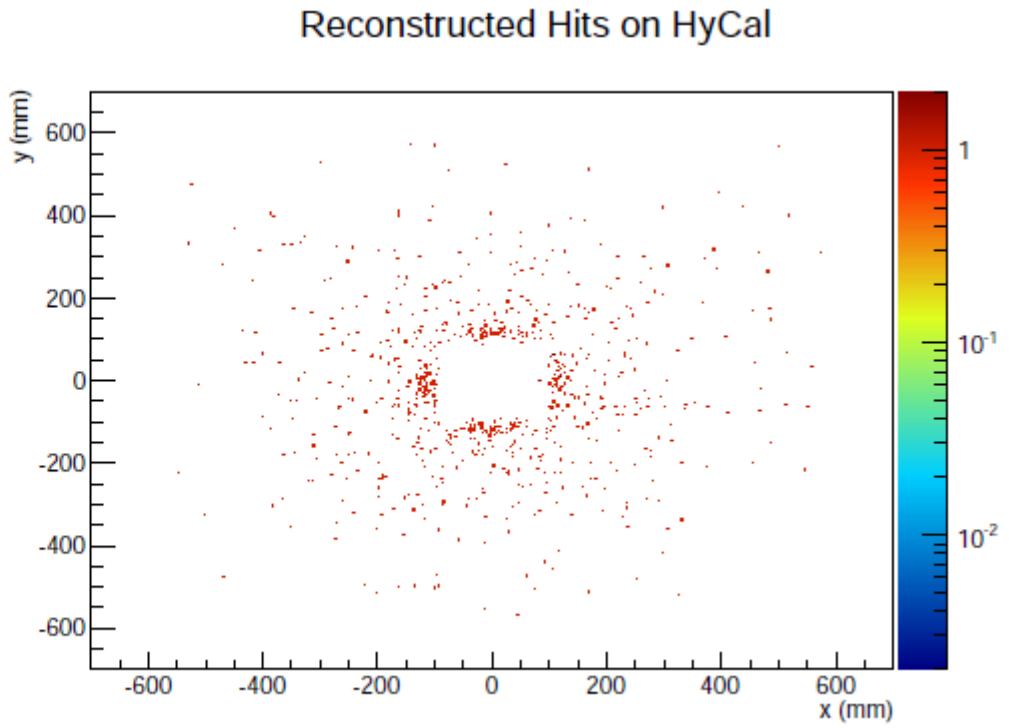




Simulation result

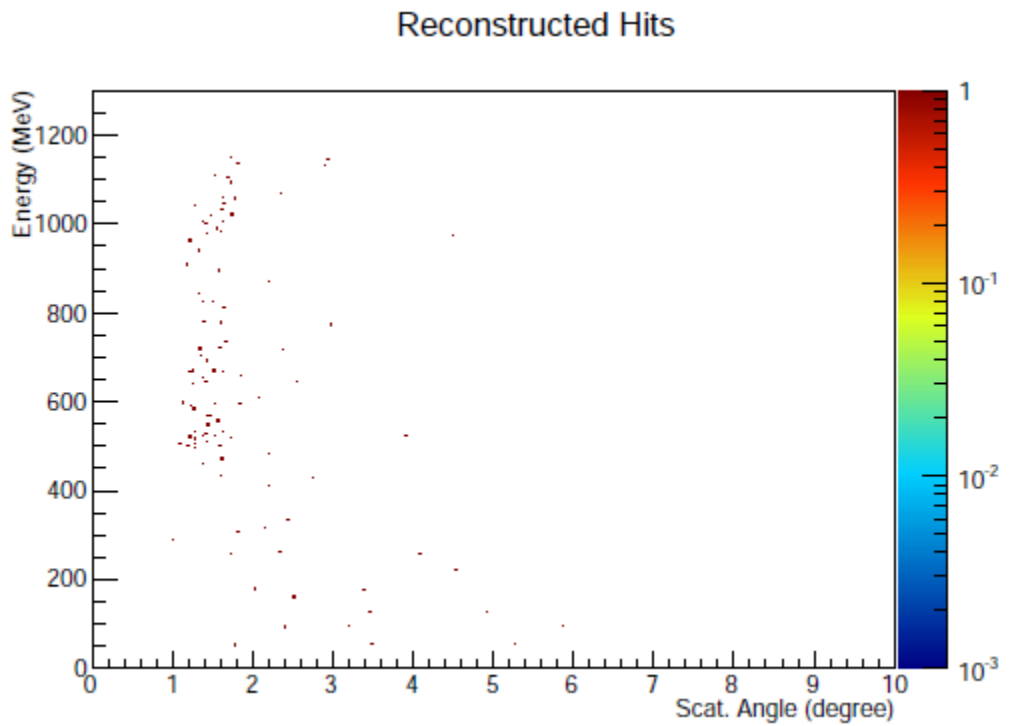
- ID: 6.4 mm, halo electrons 10^7 (10.67 sec)
- Trigger: Energy sum > 500 MeV (for 1.1 GeV beam)
- Triggered events: 721, rates: 67.6 Hz

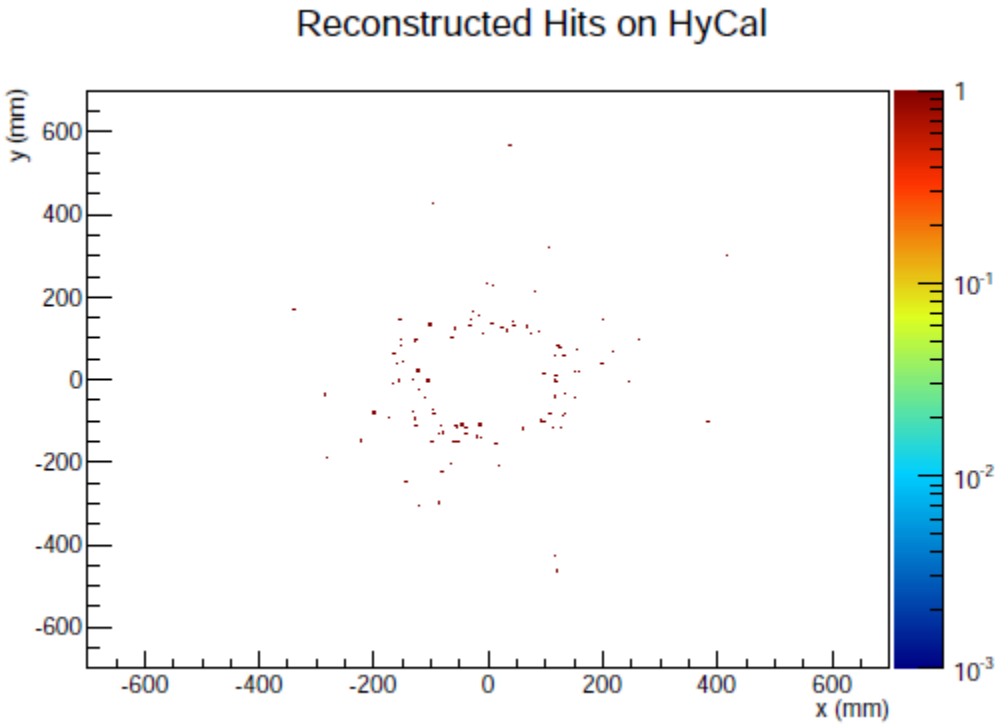




Simulation result

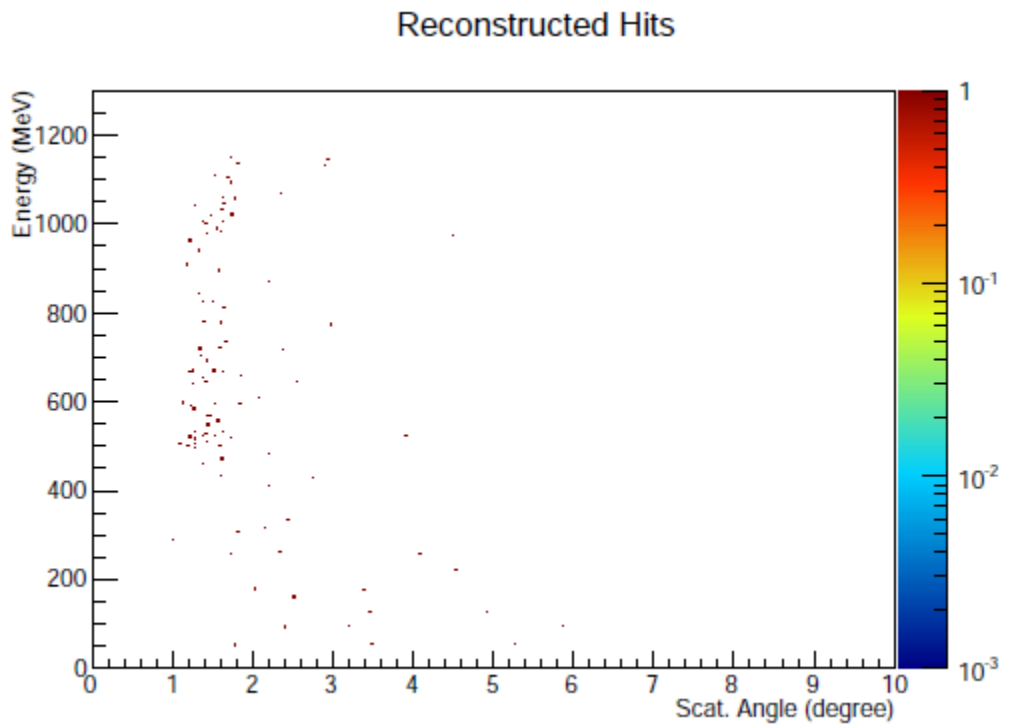
- ID: 8.6 mm, halo electrons 10^7 (10.67 sec)
- Trigger: Energy sum > 500 MeV (for 1.1 GeV beam)
- Triggered events: 116, rates: 10.9 Hz

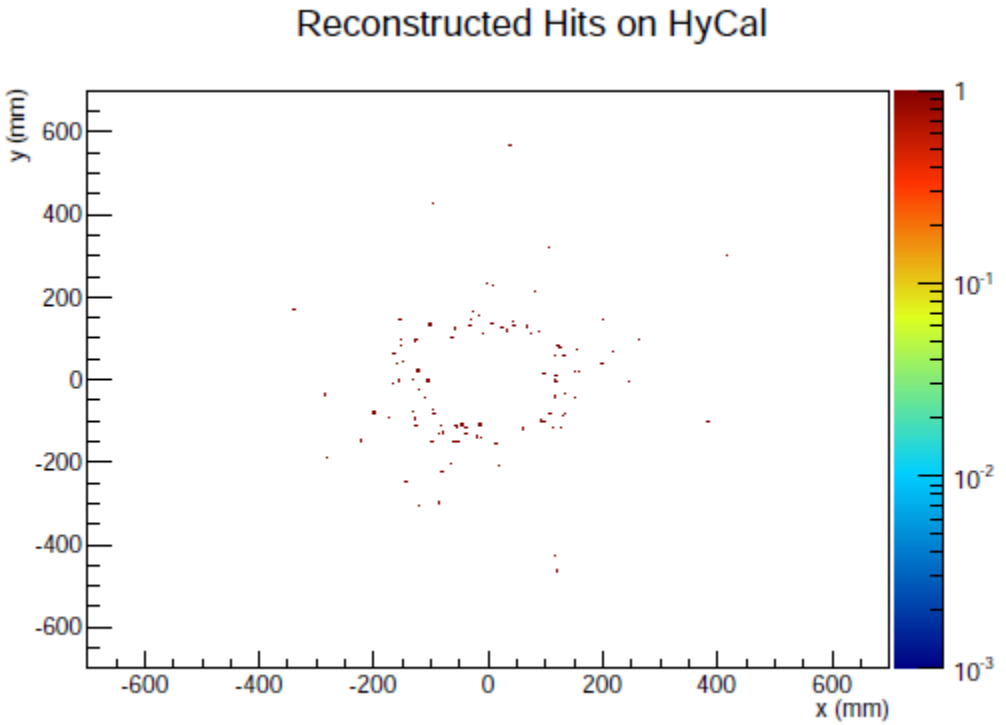




Simulation result

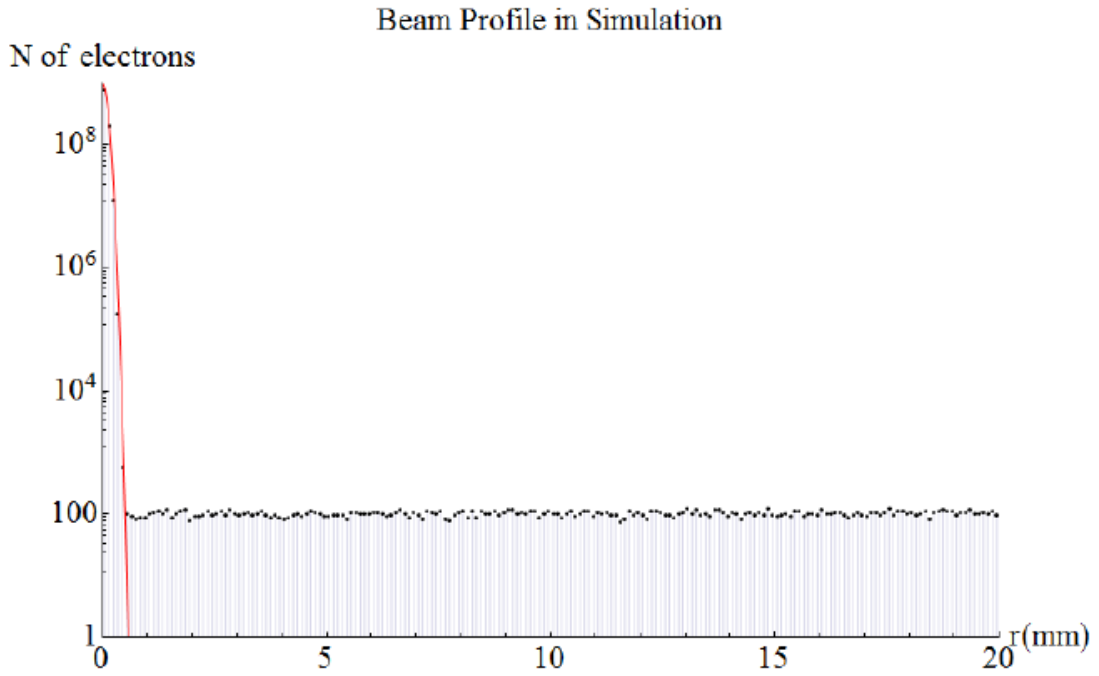
- ID: 12.7 mm, halo electrons 10^7 (10.67 sec)
- Trigger: Energy sum > 500 MeV (for 1.1 GeV beam)
- Triggered events: 14, rates: 1.3 Hz





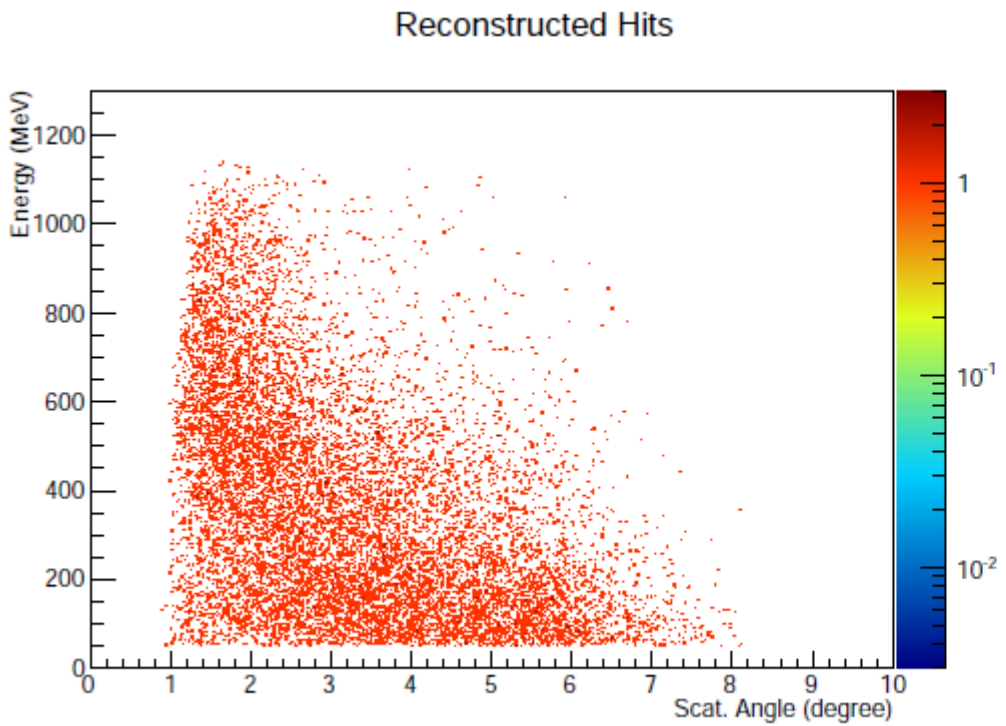
Uniform Halo

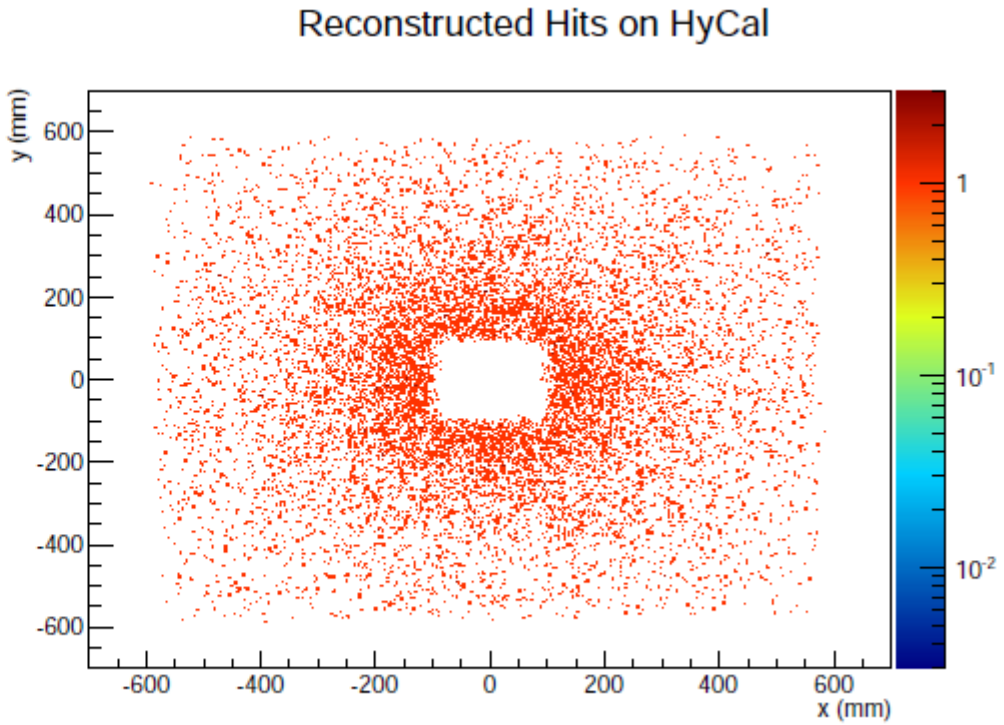
- For 12.7 mm, there is nothing because the opening is too large to be hit by the Gaussian shape halo
- Assuming there is also a uniform halo, event rates 65.8 Hz (cell only)



Simulation result

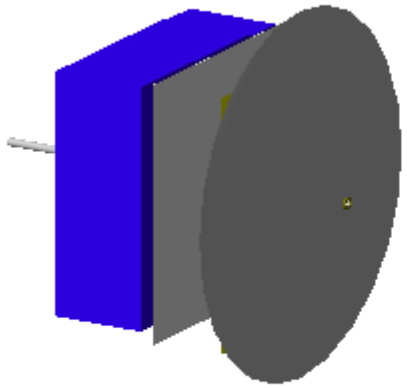
- ID: 4.8 mm, halo electrons 10^6 (1.067 sec) , uniform halo
- Trigger: Energy sum > 500 MeV (for 1.1 GeV beam)
- Triggered events: 10433, rates 10 kHz

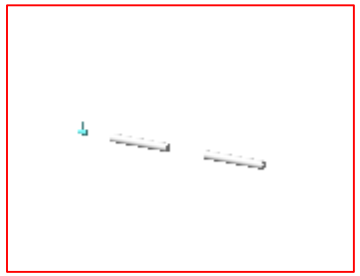




Simulation result

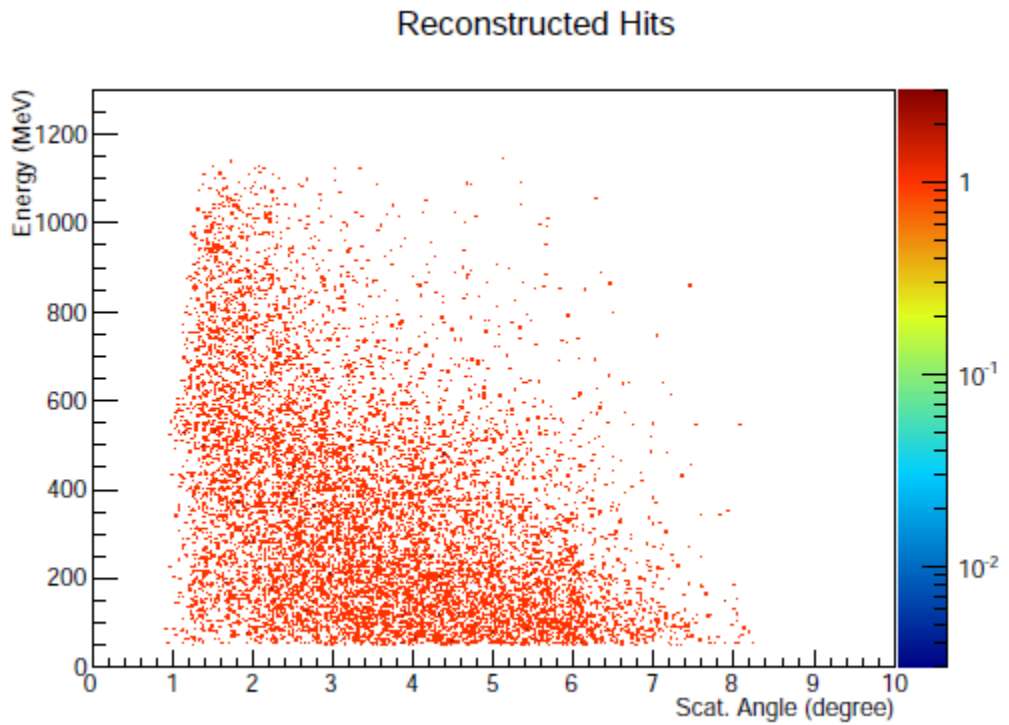
- Two collimators in a row

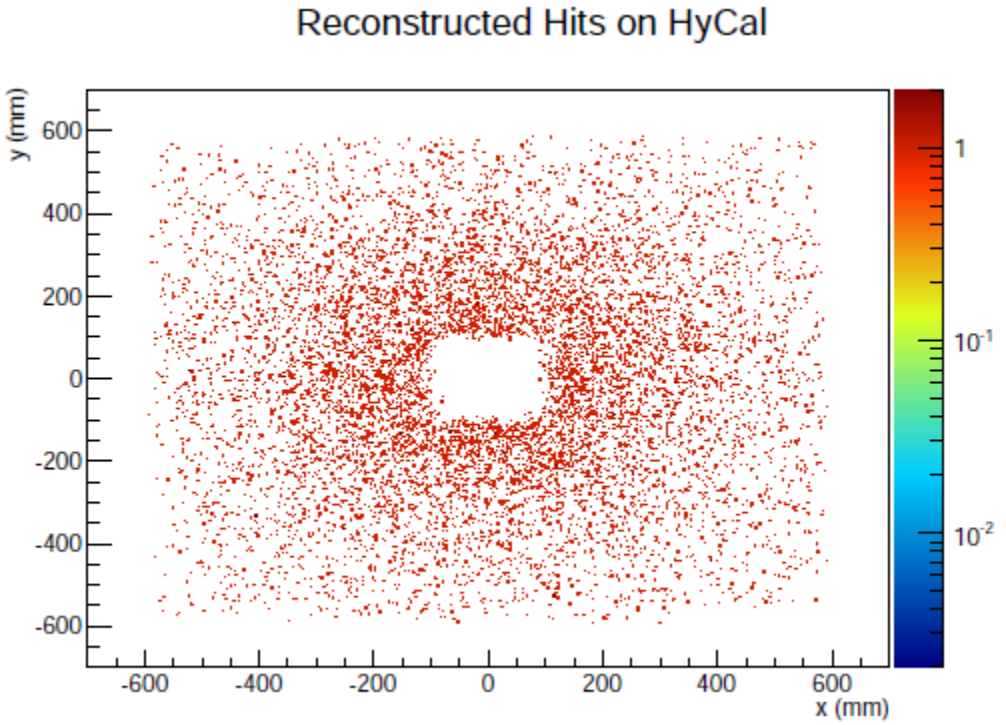




Simulation result

- ID: 12.7mm + 4.8 mm, halo electrons 10^6 (1.067 sec) , uniform halo
- Trigger: Energy sum > 500 MeV (for 1.1 GeV beam)
- Triggered events: 8262, rates 7.7 kHz





Summary

- The collimator which has a small enough opening to block the Gaussian shape halo (4.6 mm, 6.4 mm, 8.6 mm) increases the background level

- The case is very bad if there is a uniform halo with high energy (assumed to be as same as the beam energy in the simultion)

- It is not suggested to use the collimator based on the simulation, or at least to make the collimator removable