Solid target simulation

- Simulation to determine the thickness of solid target
- Electron beam current ~ 10 nA (may be lowered by a factor of up to 10)
- Event rates limit is 1 ~ 2 kHz
- Trigger, total energy deposit on HyCal > 500 MeV (for 1.1 GeV beam)

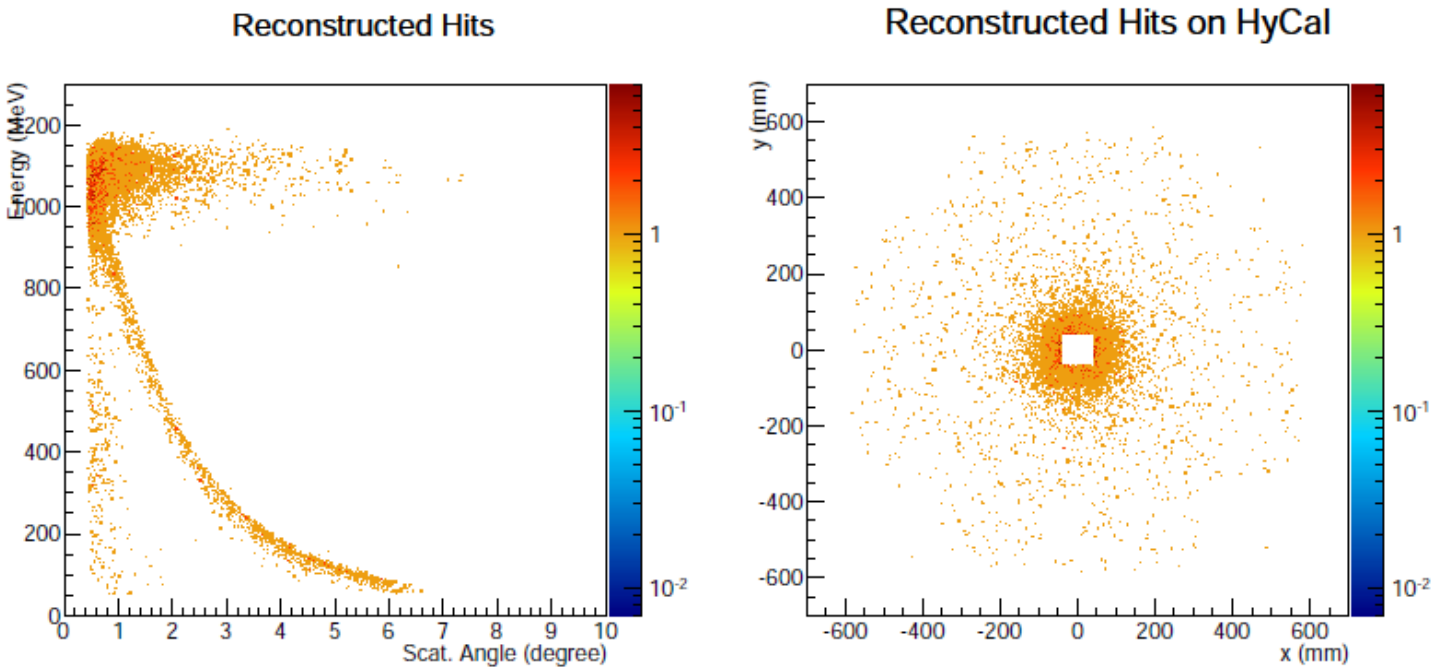
Solid target simulation

- Material in the simulation
  - Pure carbon
  - Density: 1.201 g/cm^3 (0.1 mole/cm^3)

- Target in the simulation
  - Disk shape
  - Wire shape

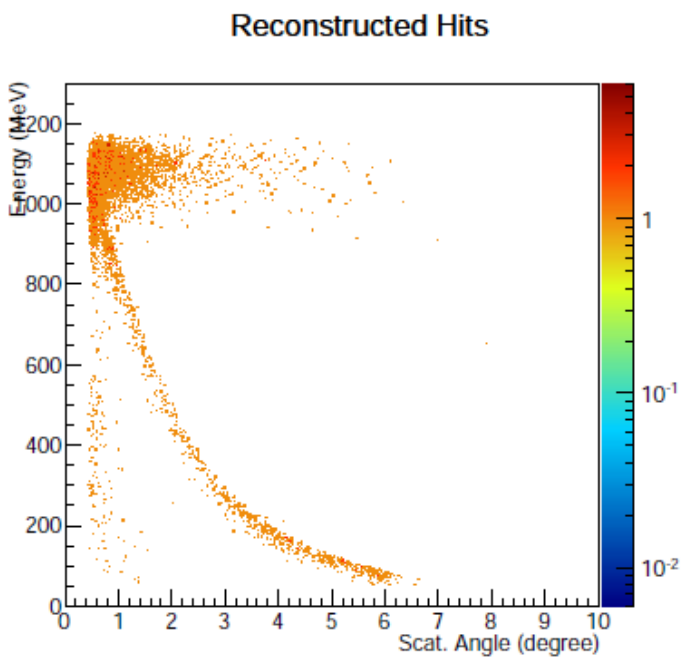
Simulation results

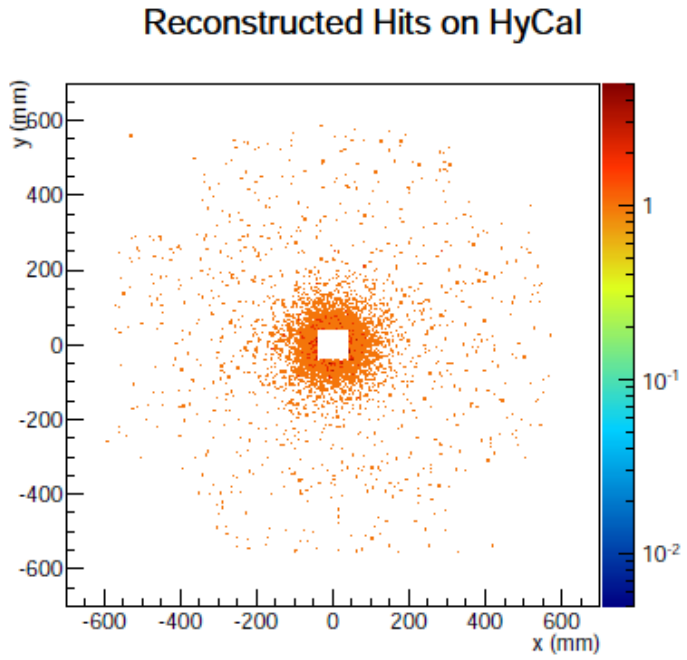
- 0.1 mm thick disk, target thickness 6.022×10^{21} atoms/cm^2
- Incident electron 10^8, equivalent to 1/625 second
- Triggered events: 12448, rate is 7.78 MHz



Simulation results

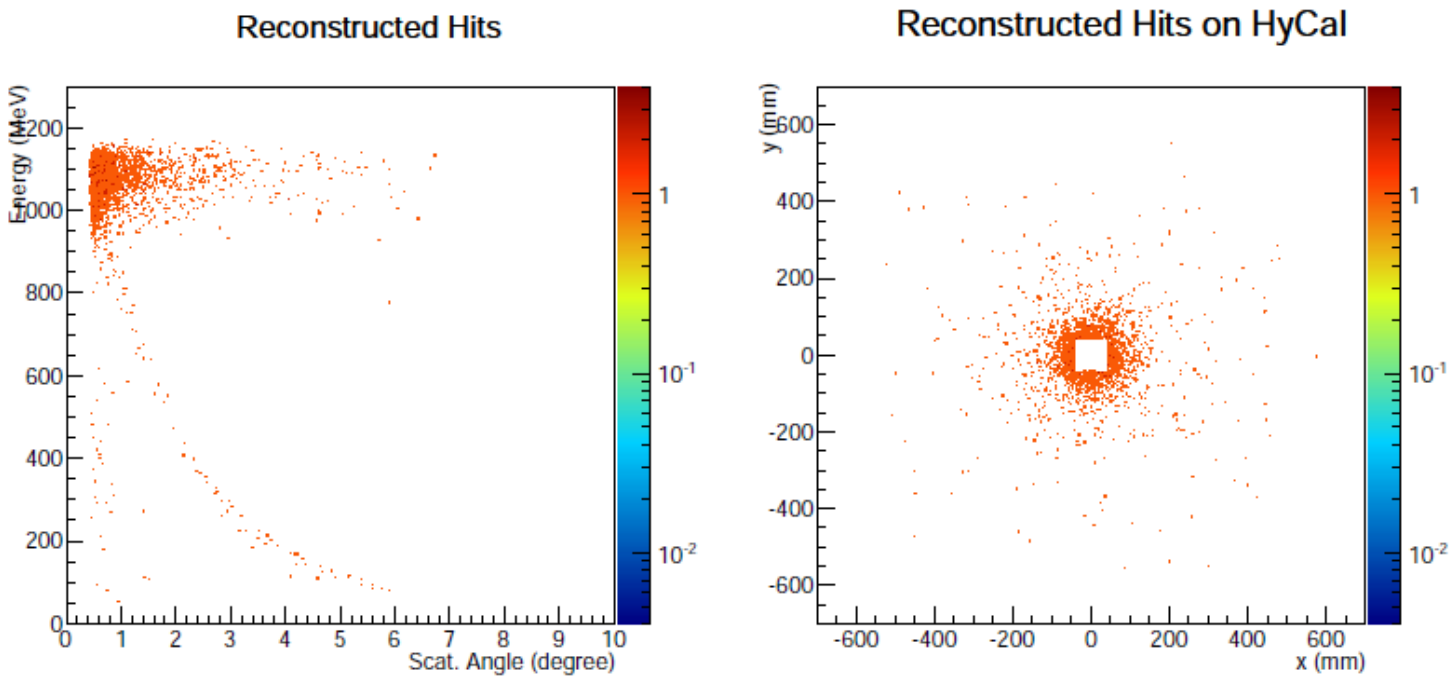
- 0.1 mm diameter wire
- Incident electron 10^8, equivalent to 1/625 second
- Triggered events: 7593, rate is 4.75 MHz





Simulation results

- 0.01 mm diameter wire
- Incident electron 5×10^8, equivalent to 1/125 second
- Triggered events: 2784, rate is 348 kHz



Summary

- If we are aiming at the 1 kHz event rates. The target thickness should be about 0.78×10^{18} C atoms/cm^2
- Lowering the beam current can reduce the event rates
- Wire shape target can have a lower rates