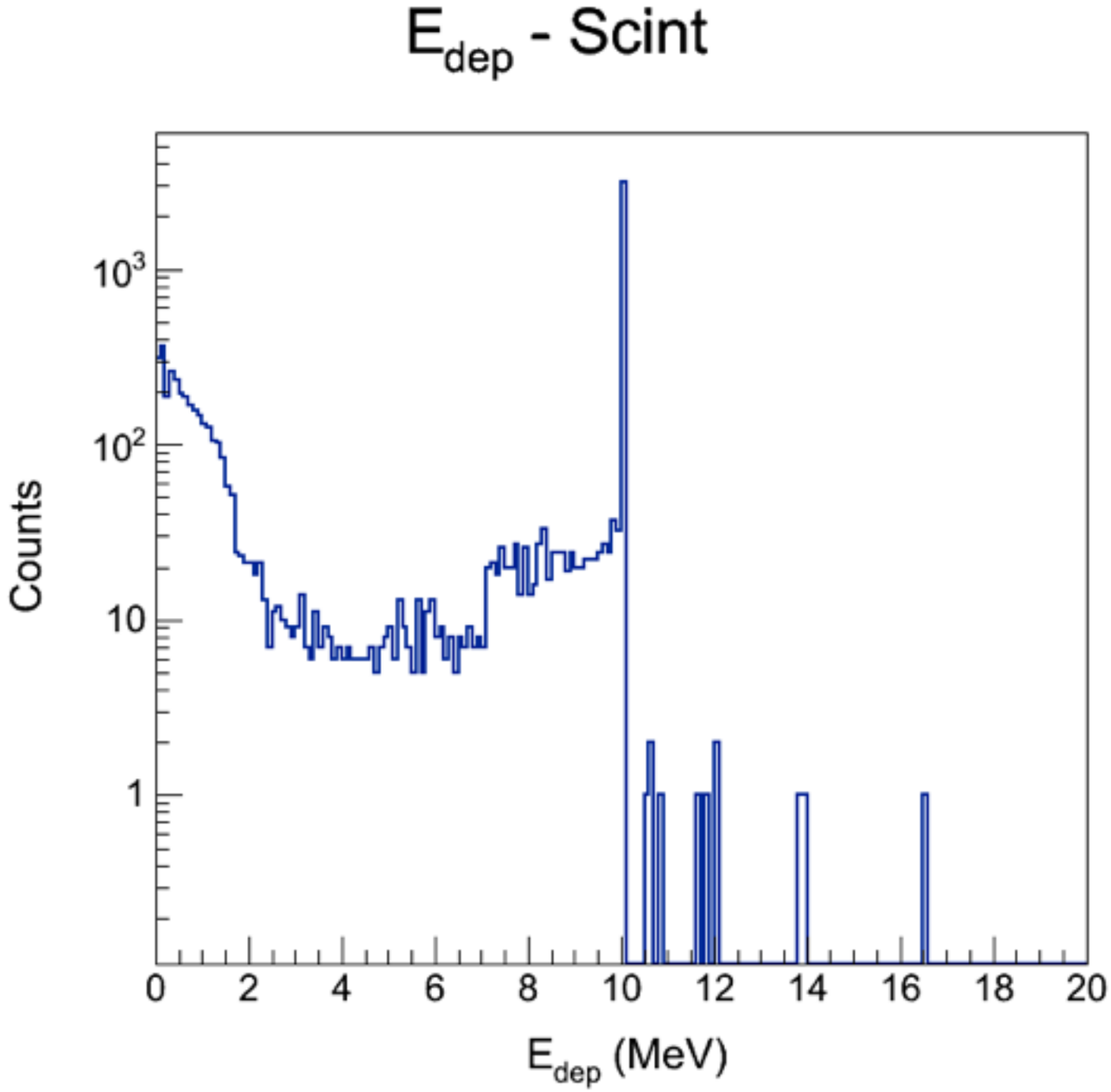
# Group Meeting

Jaebeom

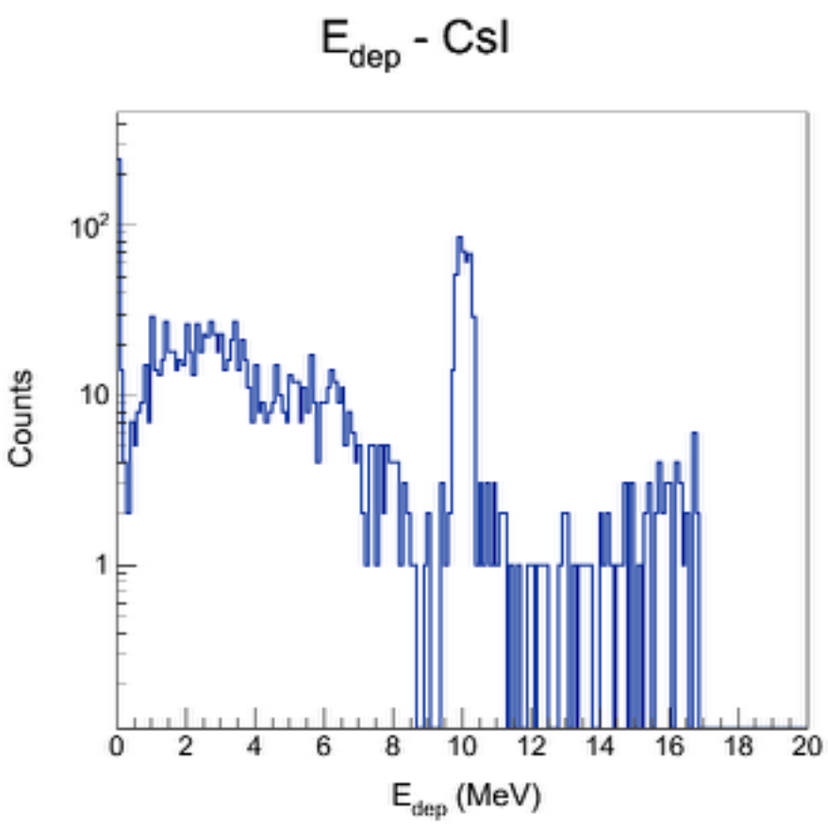
# Neutron detector simulation without Si-CsI 10MeV neutron

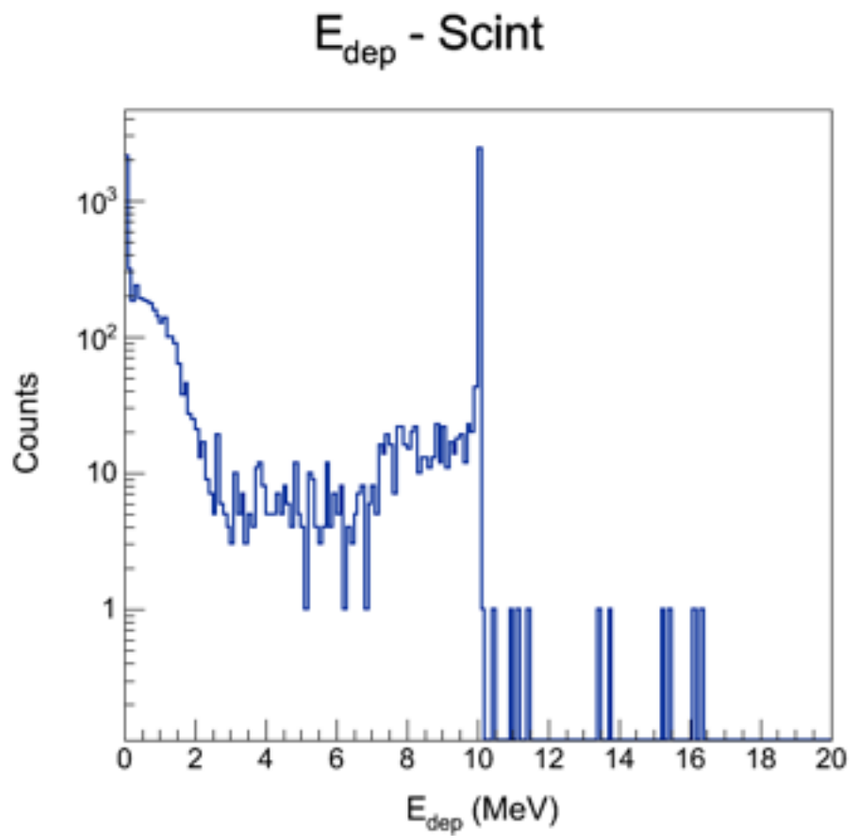


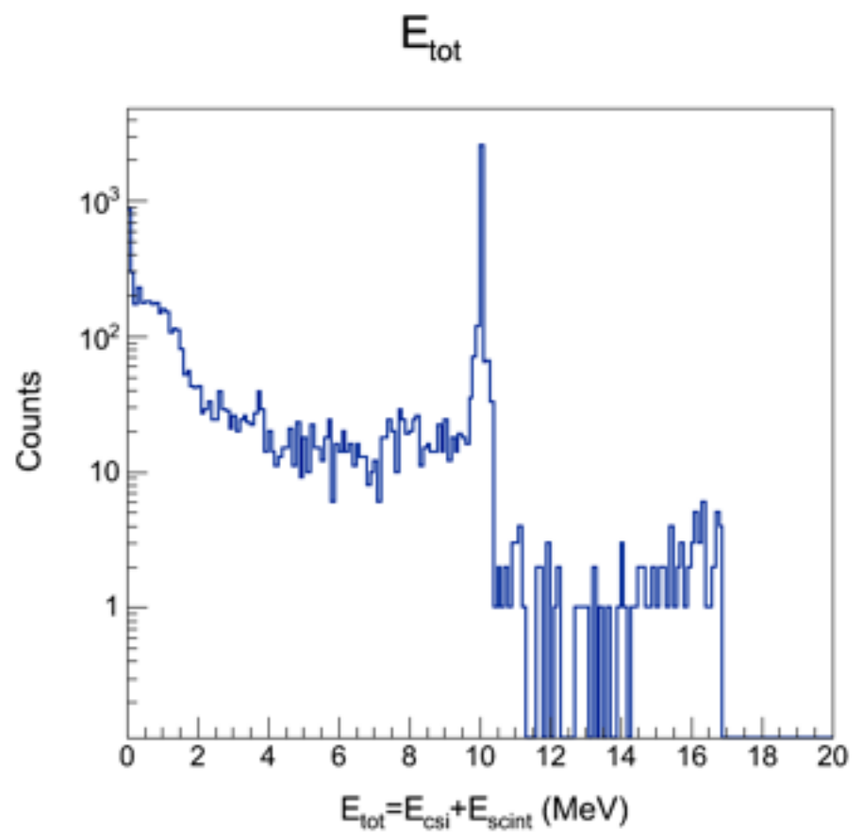

$N_{gen}$ = 10000
$N_{det}$ = 7261 (72.61%)
$N_{Edep>10MeV}$ = 3285 (32.85%)

$N_{gen}$ : # of generated neutrons
$N_{det}$ : # of detected neutrons
$N_{Edep>10MeV}$ : # of detected neutrons over 10MeV

# Neutron detector simulation with Si-CsI 10MeV neutron



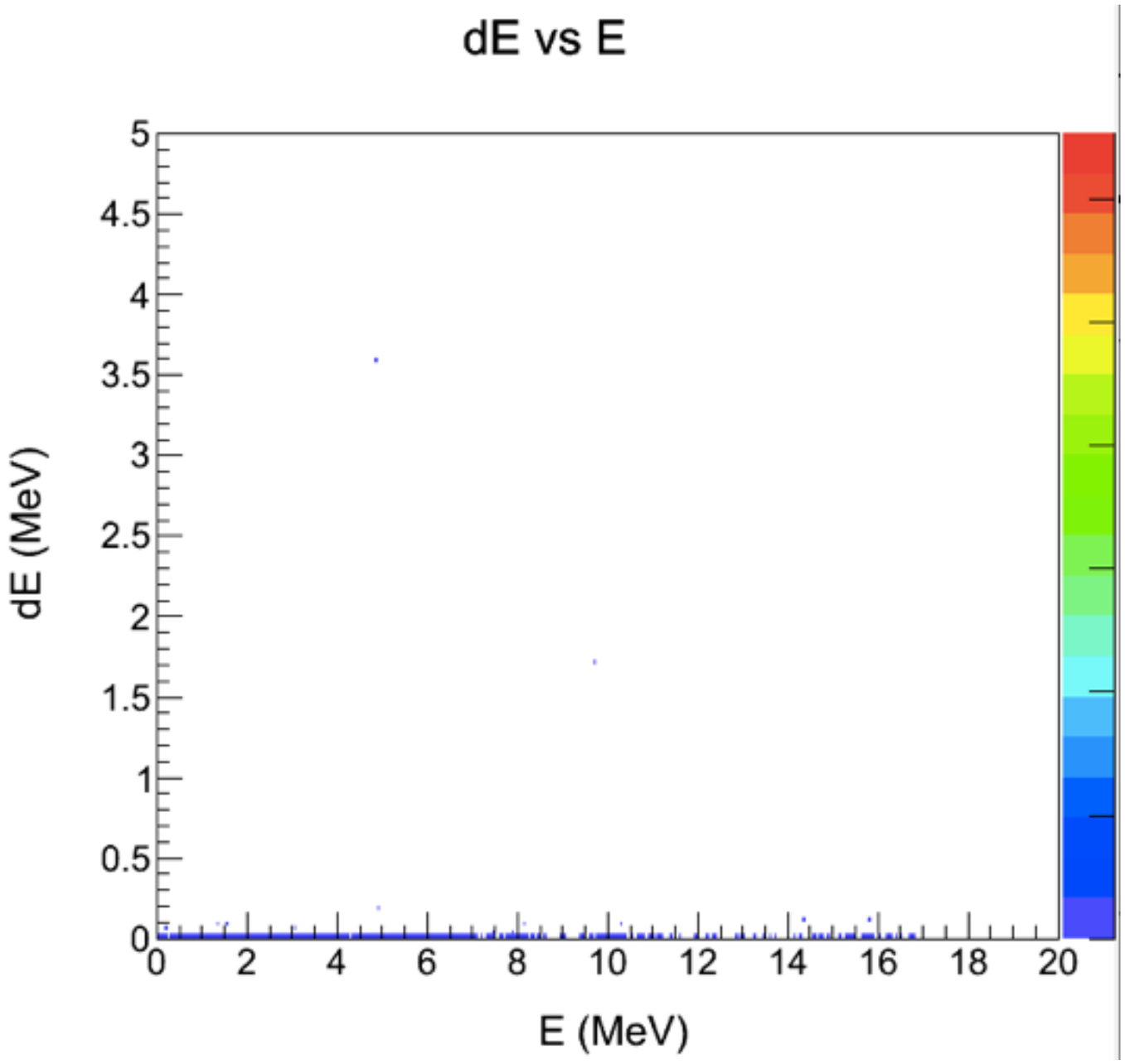



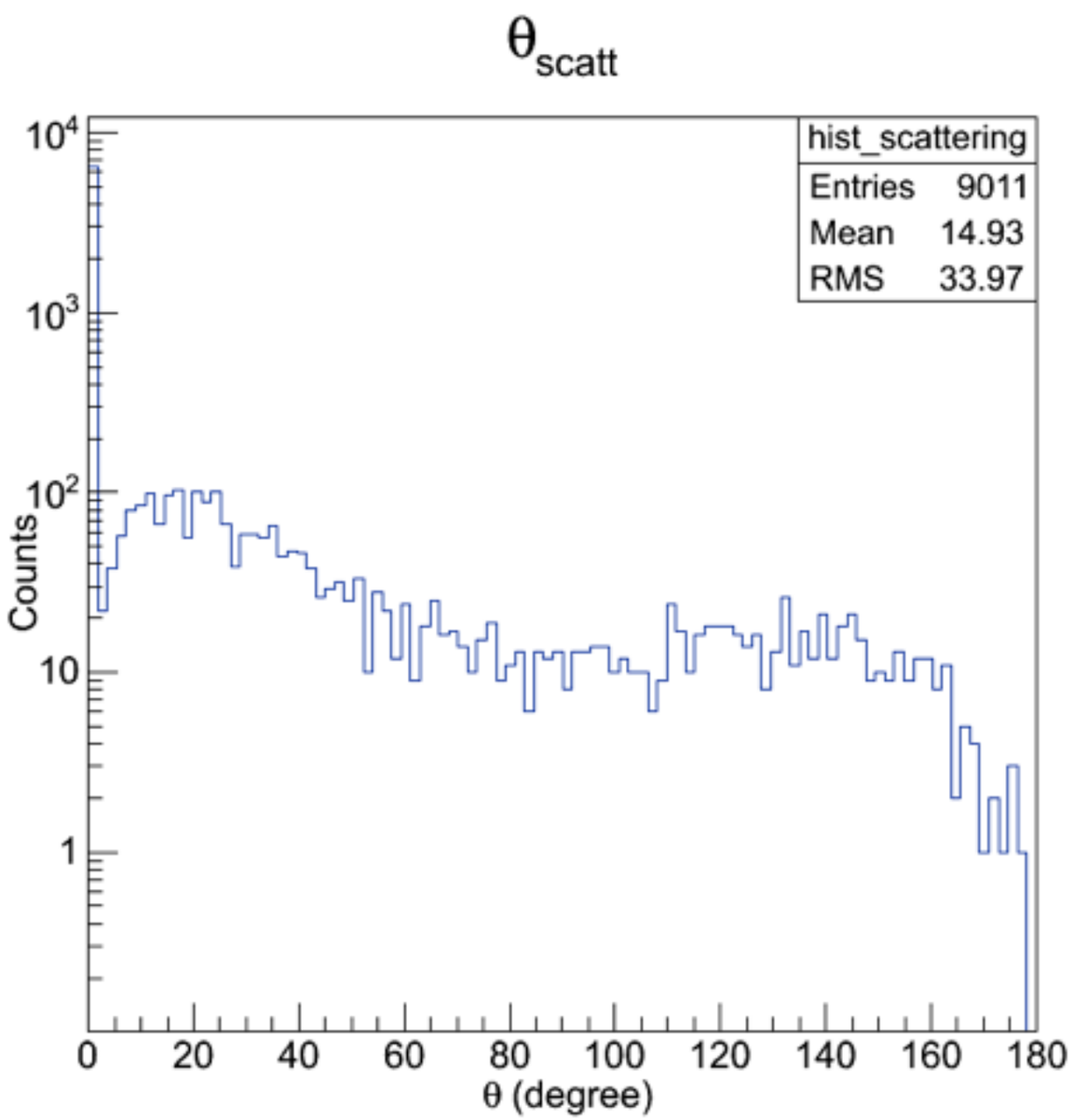

$N_{gen}$ = 10000
$N_{det}$ = 1689 (16.89%)
$N_{Edep>1MeV}$ = 1374 (13.74%)

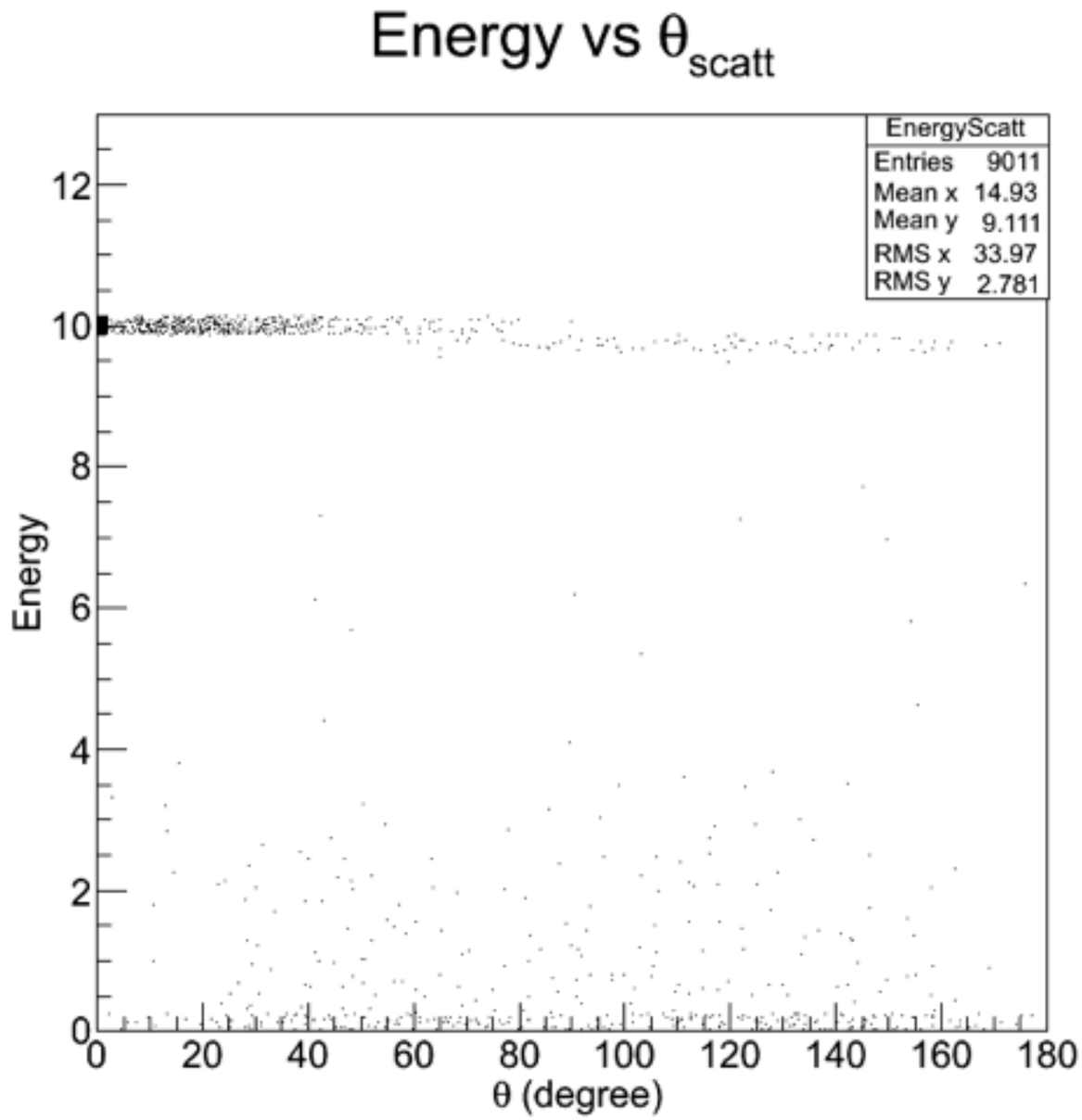
$N_{gen}$ = 10000
$N_{det}$ = 7986 (79.86%)
$N_{Edep>10MeV}$ = 2469 (24.69%)

# Neutron detector simulation with Si-CsI 10MeV neutron

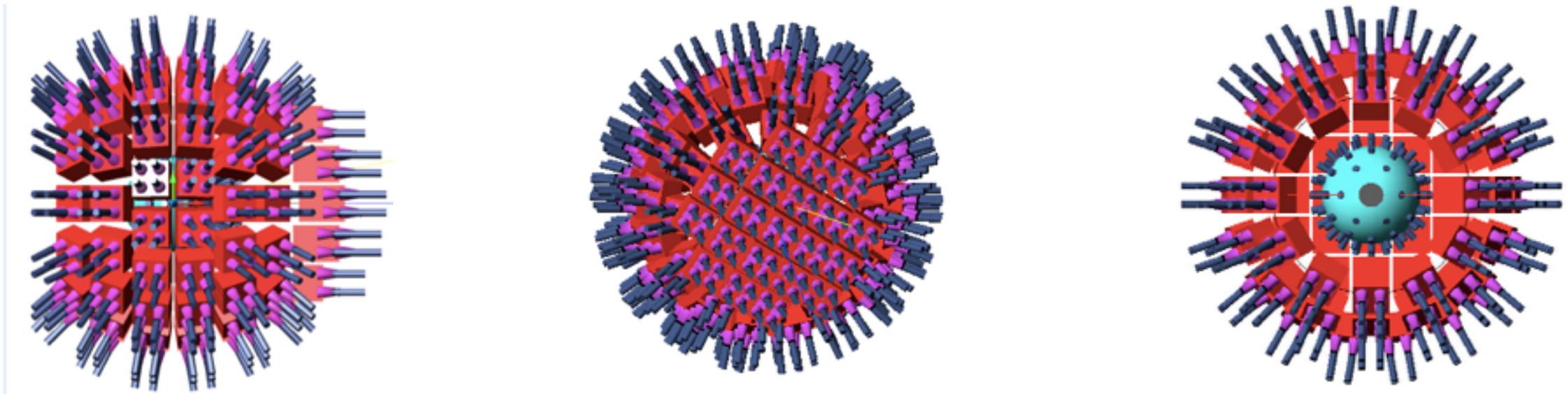


# Neutron Scattering in CsI Detector



# Full Geometry



1 super module = 4 unit detector

Forward Detector Wall : Cover Range 0 ~ 36 degree, ToF Dist. 1.3m
# of unit detector 84

Sphere Detector : Cover Range 36 ~ 144 degree, ToF Dist. 1.1m
# of unit detector 368

| Theta angle | Phi angle division | # of super (unit detector) |
|---|---|---|
| 45 degree | 30.0 degree | 12 (48) |
| 63 degree | 22.5 degree | 16 (64) |
| 81 degree | 20.0 degree | 18 (72) |
| 99 degree | 20.0 degree | 18 (72) |
| 117 degree | 22.5 degree | 16 (64) |
| 135 degree | 30.0 degree | 12 (48) |

Total # of unit detector (0 ~ 144 degree) = 452
Total # of unit detector (0 ~ 90 degree) = 268

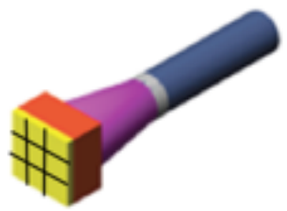
# Plan

- Simulation with different neutron energy
- Simulation with full geometry

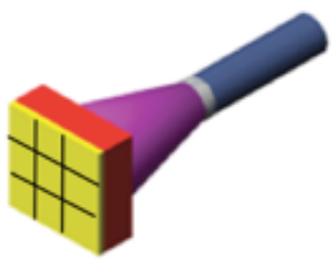
# Back- up

# SiCsI Geometry – with JI Kim

**Total 58 detector units**
**($17.5^{o} < \theta_{lab} < 77.5^{o}$)**
**9 x 9 x 0.01 $cm^3$ Si (3 x 3 Pad)**
**9 x 9 x 5 $cm^3$ CsI (PMT readout)**



**Total 35 detector units**
**($78^{o} < \theta_{lab} < 150^{o}$)**
**15 x 15 x 0.01 $cm^3$ Si (3 x 3 Pad)**
**15 x 15 x 5 $cm^3$ CsI (PMT readout)**

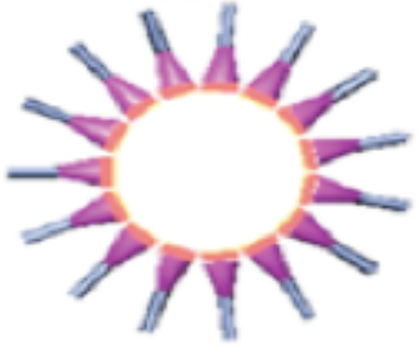


CsI(T1) cover polar angle 17.5° ~ 150°
17.5° ~ 77.5° : 4 detector pieces
(15° interval)

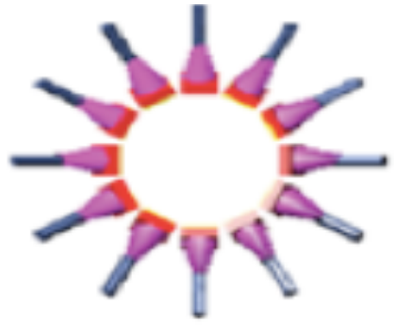
78° ~ 150° : 3 detector pieces
(24° interval)

**8units** **12units** **18units** **20units**
**25°** **40°** **55°** **70°**

**15units**
**90°**



**12units**
**114°**

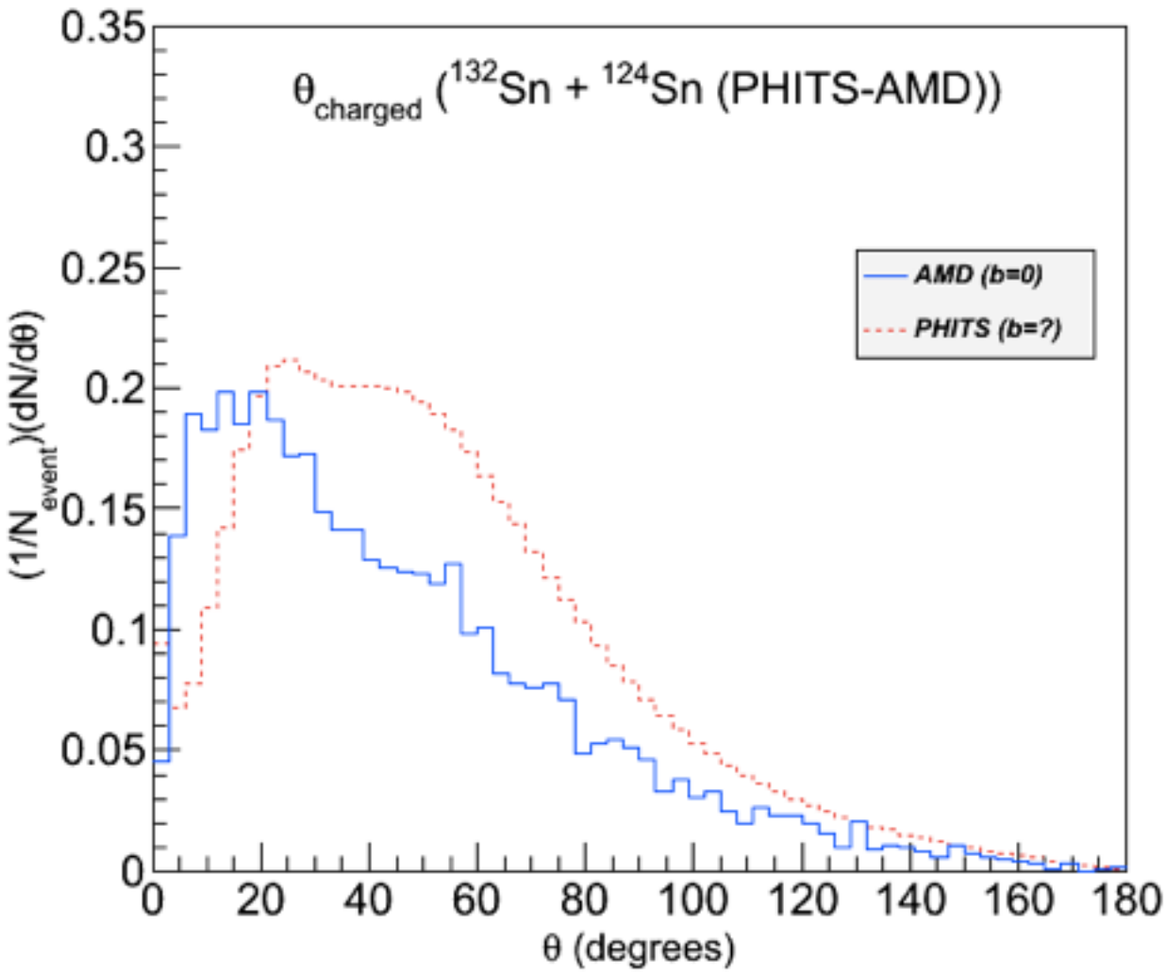


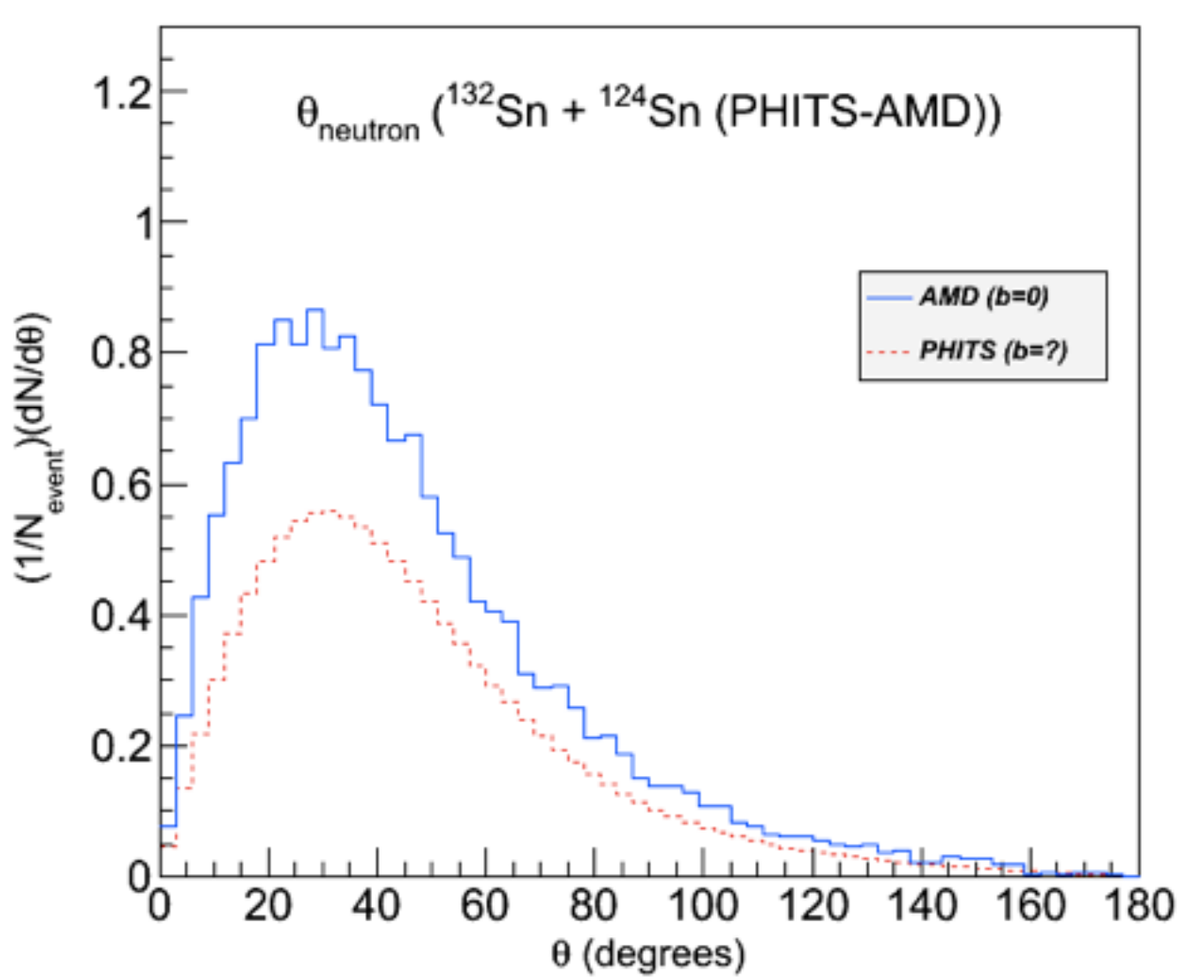
**8units**
**138°**

# Det.CoverRange

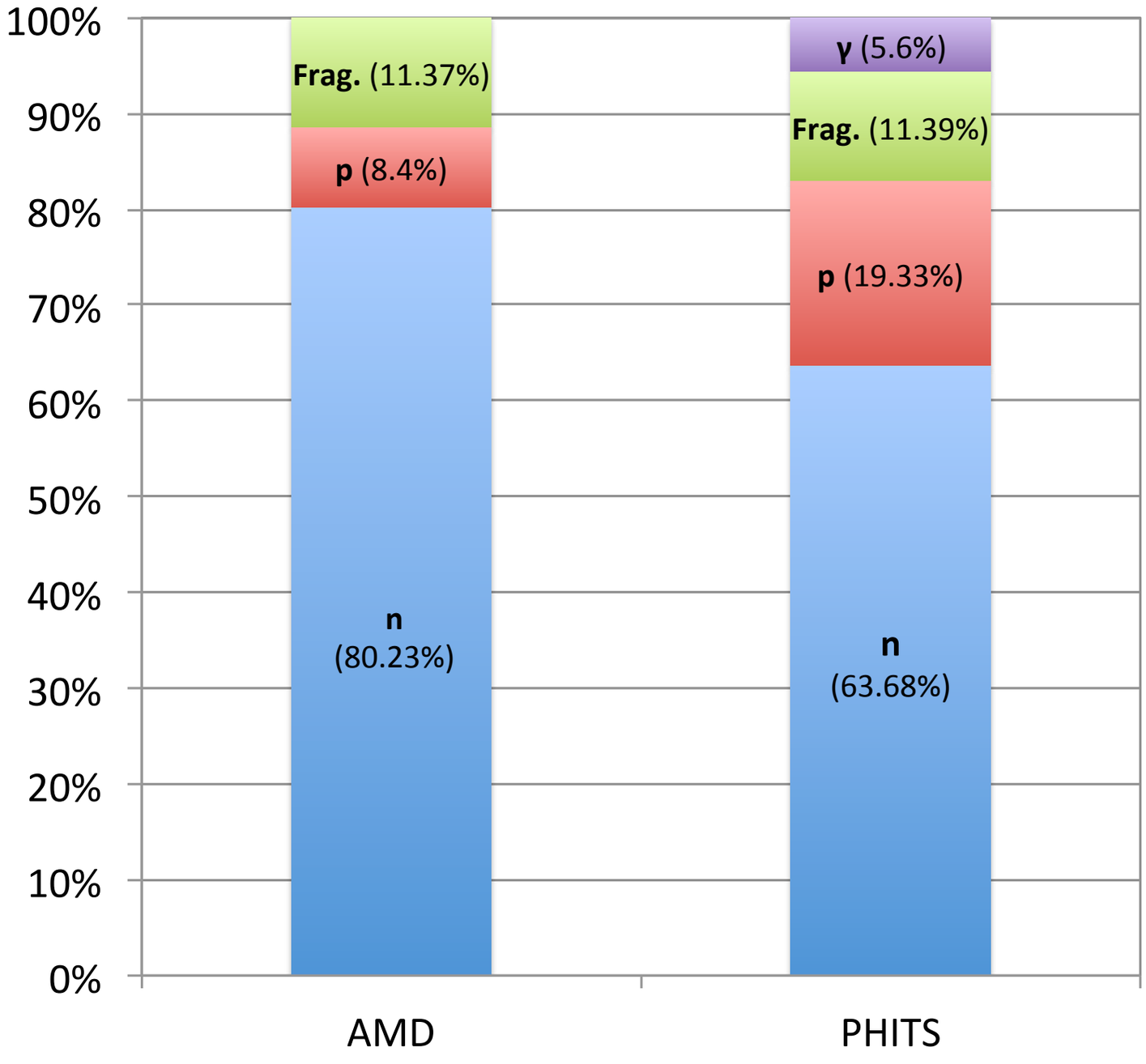
| | N_gen(△θ) | N_det(△θ) | Det.CovRange (%) (simulation) | Det.CovRange (%) (geometrical) | # of particle/ Det.cell/event | Occupancy |
|---|---|---|---|---|---|---|
| 1 : (17.5°<θ<32.5°) | 2.67 | 1.53 | 57.25 | 58.43 | 0.191 | 0.0156 |
| 2 : (32.5°<θ<47.5°) | 1.98 | 1.14 | 57.56 | 57.62 | 0.095 | 0.0077 |
| 3 : (47.5°<θ<62.5°) | 1.71 | 1.14 | 66.88 | 67.81 | 0.063 | 0.0052 |
| 4 : (62.5°<θ<77.5°) | 1.17 | 0.73 | 62.33 | 65.69 | 0.037 | 0.0030 |
| 5 : (77.5°<θ<102°) | 1.10 | 0.84 | 76.36 | 79.11 | 0.056 | 0.0046 |
| 6 : (102°<θ<126°) | 0.56 | 0.37 | 67.47 | 70.70 | 0.031 | 0.0025 |
| 7 : (126°<θ<150°) | 0.25 | 0.14 | 57.03 | 64.35 | 0.018 | 0.0014 |

# AMD&PHITS – Theta Distribution (Charged/Neutron)



# AMD & PHITS




AMD : $^{132}Sn + ^{124}Sn$ - (20 MeV/u)
impact parameter : b = 0
$N_{event}$=2010

PHITS : $^{132}Sn + ^{124}Sn$ - (18.5 MeV/u)
impact parameter : wide
$N_{event}$=272018