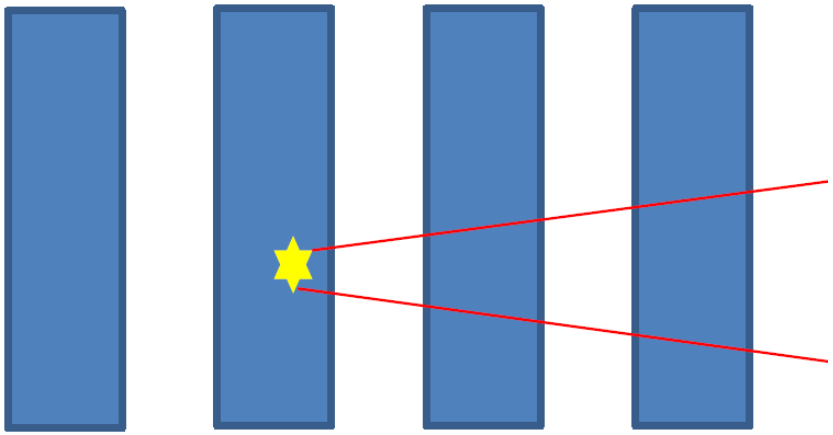
Neutron Detector Simulation
2014 / 05 / 30



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Back Scattering Rate

- **Back Scattering Rate (%)**

  = {(한 event 내에서 real hit들의 hitTime에 따른 layerNum가 순서대로 정렬되지 않는 경우가 단 한 번이라도 발생한 event의 개수) / (최소 1개 이상의 real hit들을 남긴 event의 개수)} X 100

(%)	100 MeV	300 MeV
3 MeV	13.0699	53.8375
5 MeV	9.62404	48.7303
7 MeV	7.29519	43.8372
10 MeV	5.02107	38.11

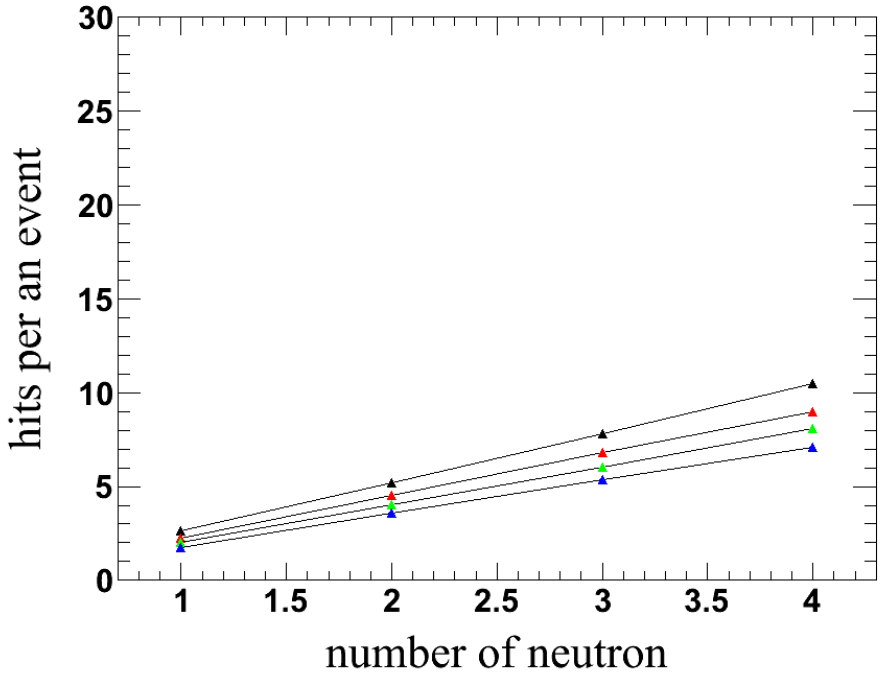
Real Hits per Event

- **Real Hits per event (%)**

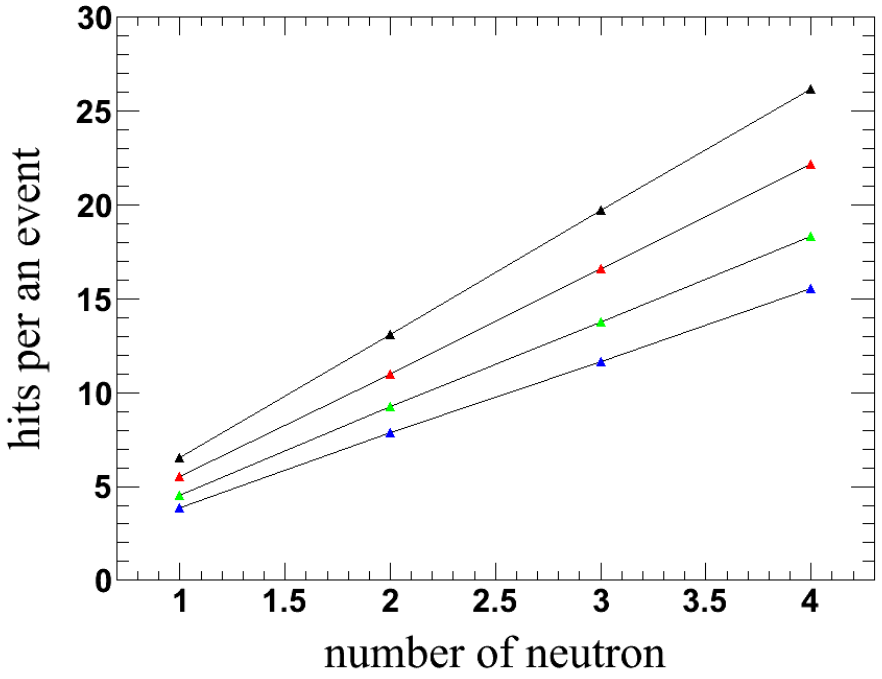
= {(the number of total real hits) / (the number of events which has at least one real hit)} X 100

Black : 3 MeV
Red : 5 MeV
Green : 7 MeV
Blue : 10 MeV

100 MeV



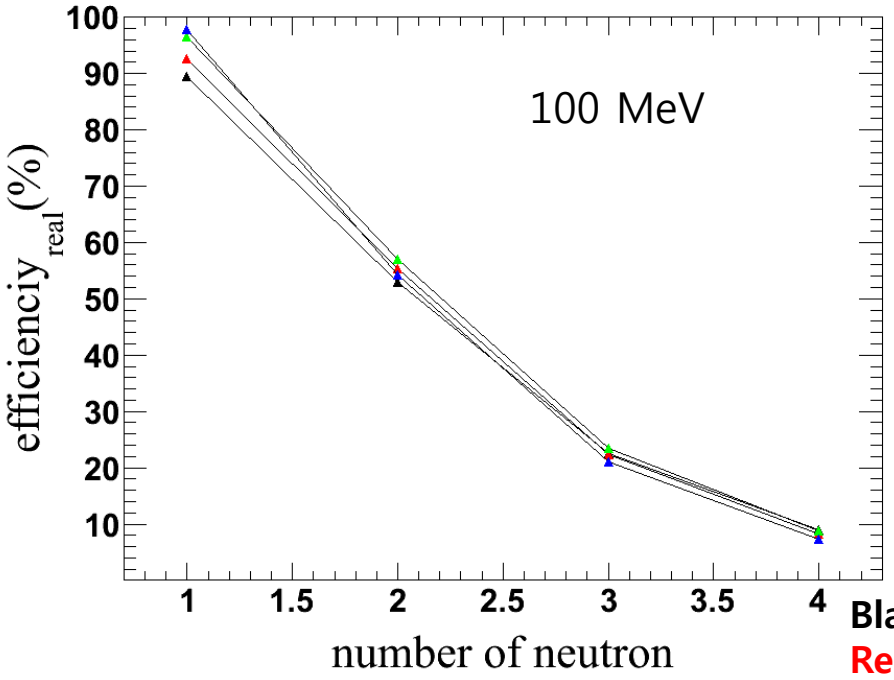
300 MeV

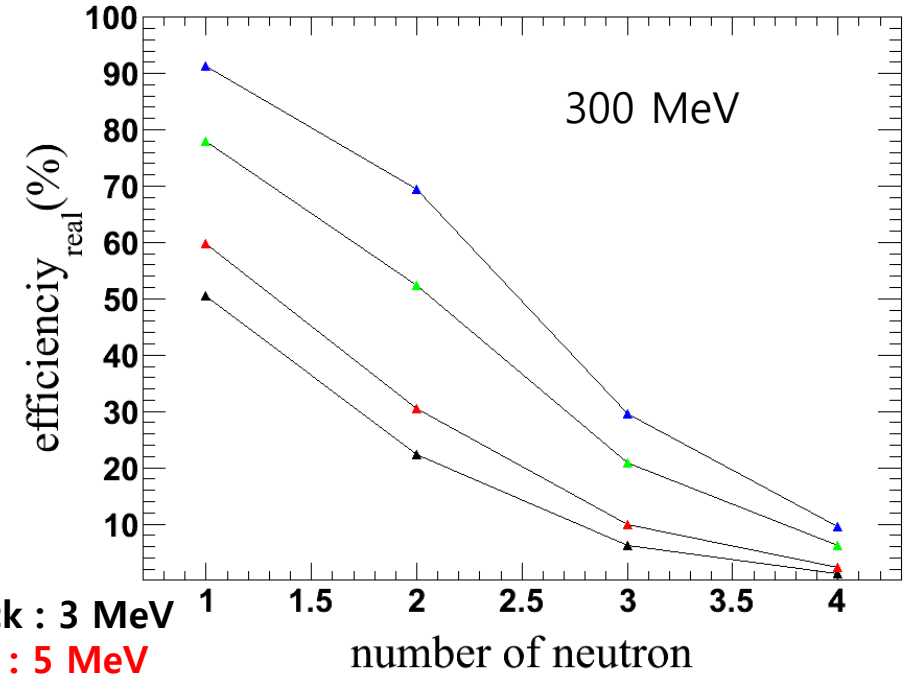


Modified Real Efficiency

- In modified real efficiency, **'null events'** is not considered.
  - **Null event : An event which remains no real hit**

- **Modified Real Efficiency (%) = {(Real_good) / (event_number)} × 100**
  - **Real_good :** the number of events satisfying both Beta condn & Geometric condn, and also satisfying (Real incident neutrons) = (Reconstructed incident neutrons) **+ having at least one real hit**
  - **Event_number :** ~~10000 events~~ → **The number of events which has at least one real hit**





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Modified Real Efficiency

- For both cases, higher threshold cases has somewhat higher efficiency.
  - For 100 MeV cases, a little difference
  - For 300 MeV cases, pretty much difference
  - Strongly related to back scattering rate? Or hits per event?

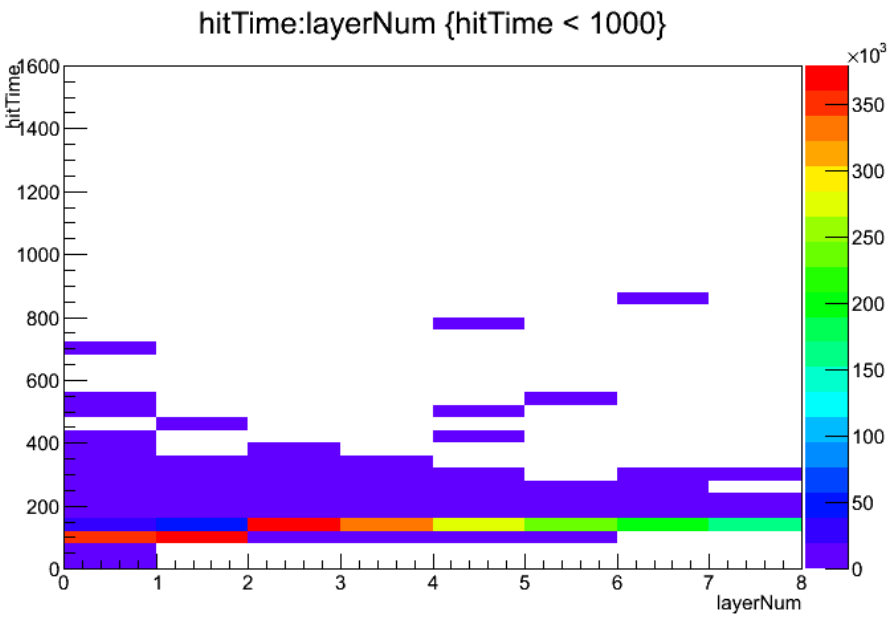
Next Step

- Checking veto efficiency using proton beam
- Improving beta condn.
- Checking hitTime distribution

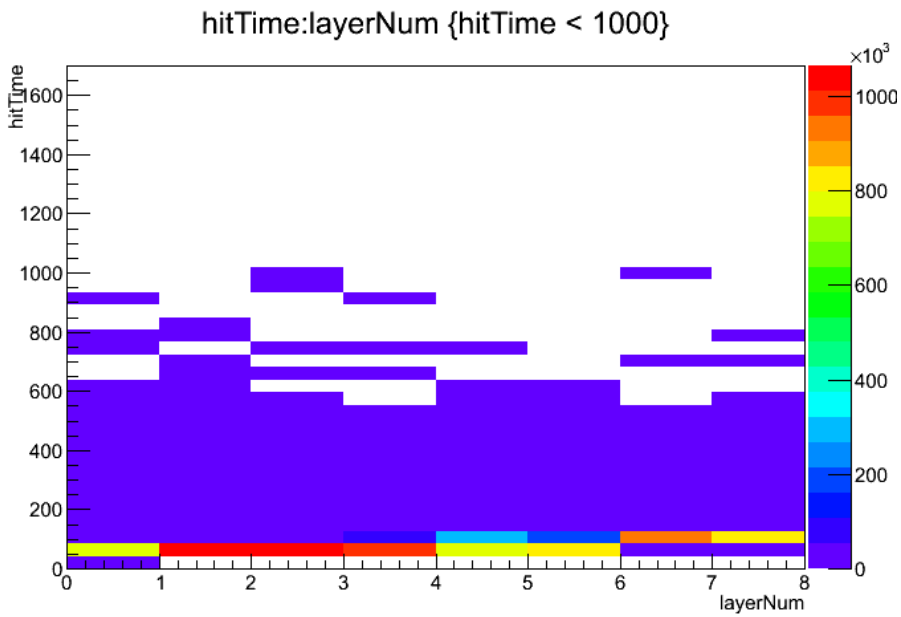
hitTime Distribution

- layerNum Vs. hitTime

100 MeV



300 MeV



Veto Efficiency

- Particle : Proton
- Events : 30000
- In the algorithm, the events which deposit energy more than 3 MeV on veto counter are removed.