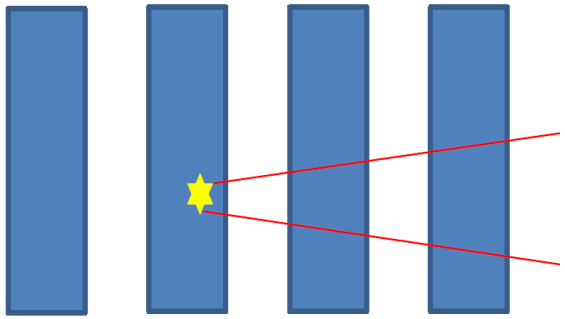
Neutron Detector Simulation
2014 / 12 / 15



Korea University
Nuclear Physics Lab.
BumGon Kim

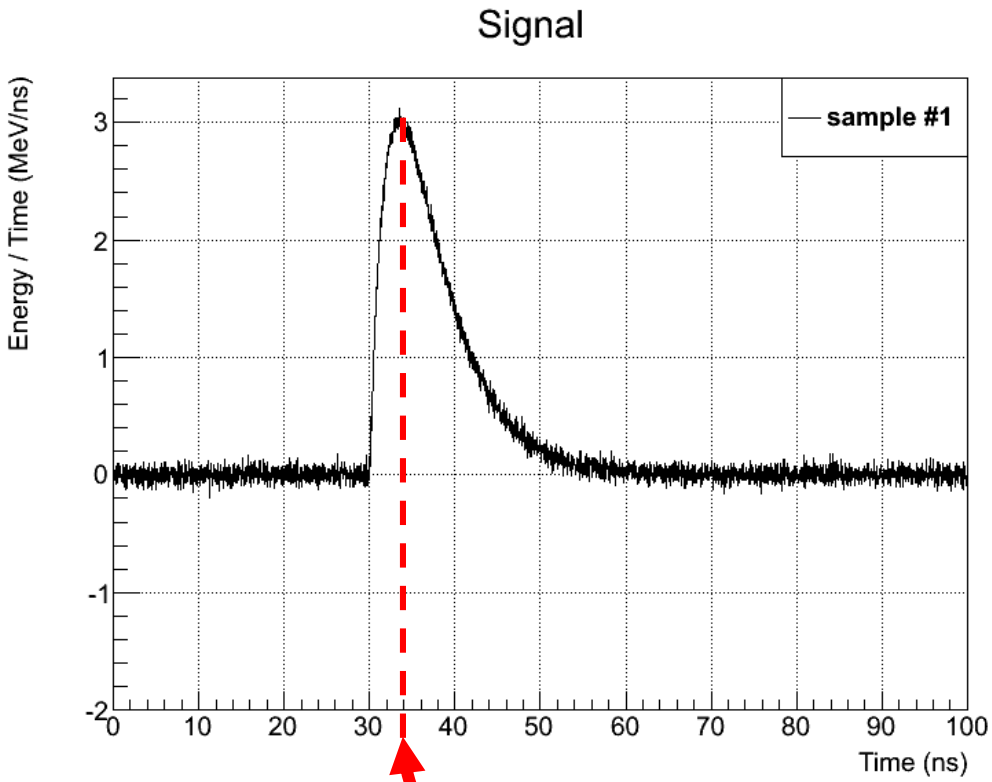
Signal Simulation

- Why we should simulate the **"signal"**?
  - **HitTime of the particle in simulation ≠ detector hitTime in experiment**
  - In experiment, in each scintillator module, within the gate time(by the trigger), **the sum of energy deposits** by the particle(s) within the time resolution & position resolution turns up in the form of **"signal"**.
  - When the **energy integration of signal became larger than threshold**, the **signal** is considered as it was made by **neutron**, and **that time** is saved as a **"signal hitTime"**.
  - Instead of using the **real hitTime of the particle**(only god knows in reality.), we will have to use the **signal hitTime in simulation**.

- By using the **signal simulation**, we can do more **experiment-like(realistic) simulation**.

Signal Simulation Example

- Total energy deposit : 30 MeV
- Threshold : 10 MeV



- The Number of TDC Channel(bins of x-axis) : 4096 bins
- Gate Time : 100 ns
- Time per TDC Channel : (100 ns)/(4096 bins) = 0.0244 ns/bin

```
detector hitTime[0](time over threshold) : 34.2773 (ns)
```

Next Step

- How much is the difference between the real hitTime of particle & detector hitTime in simulation?

- Apply the signal simulation in the detector algorithm code.
  - How much changes?