Backgrounds due to incident neutrons

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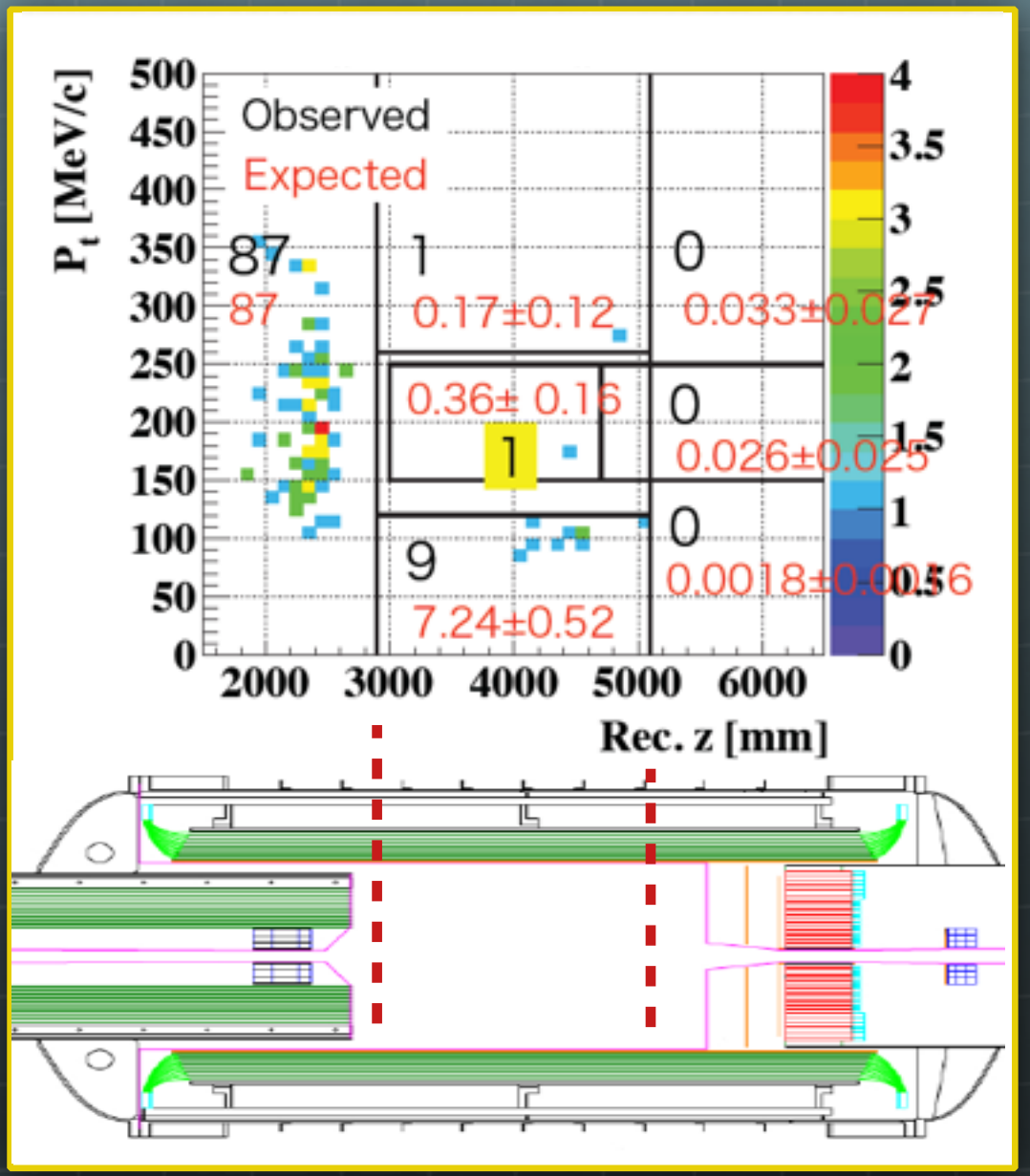
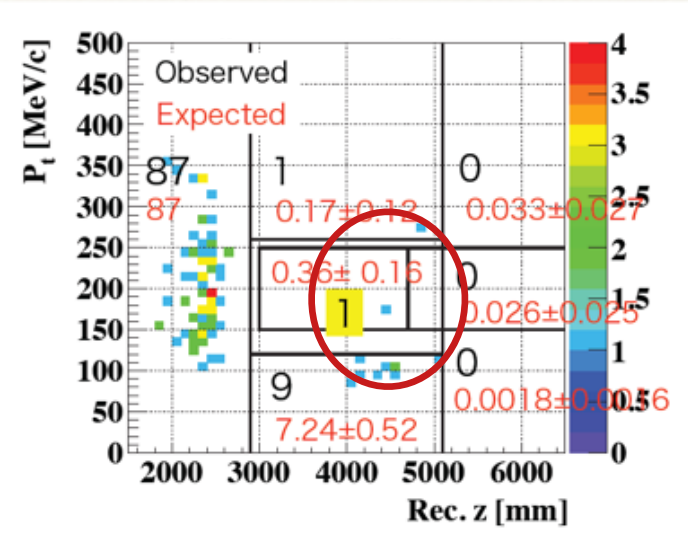
Results of May 2013

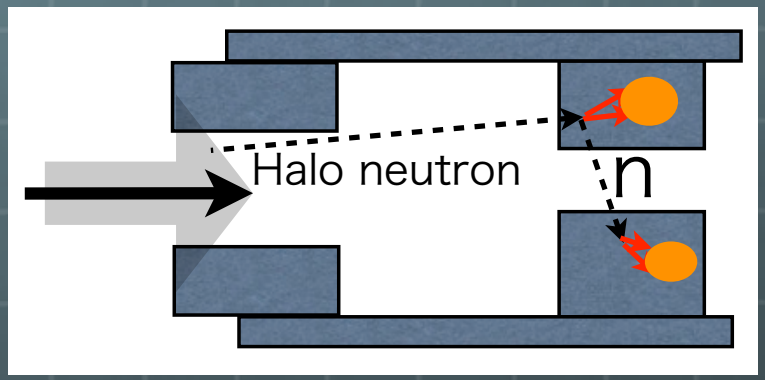
- Removed B.G. events learned from the E391a. (π^0 production at the detectors)
- We found two new sources of the B.G.
- Upgraded detector for run 2015

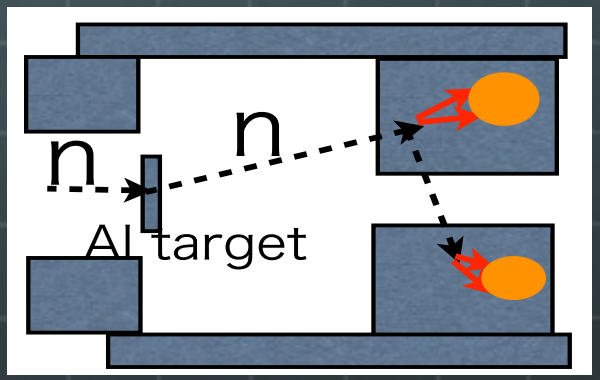
$$\mathrm{S.E.S} = 1.29 \times 10^{-8}$$



Halo neutron events



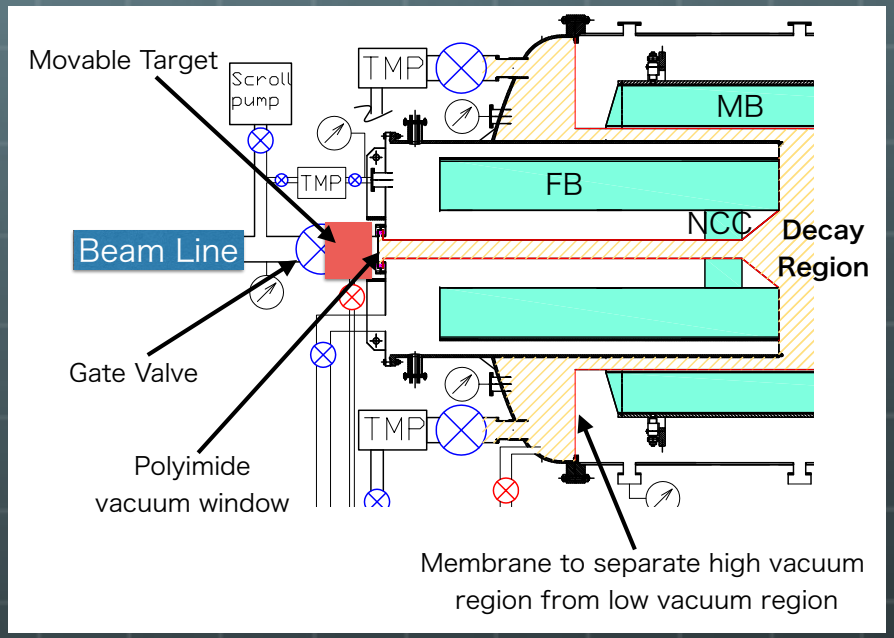


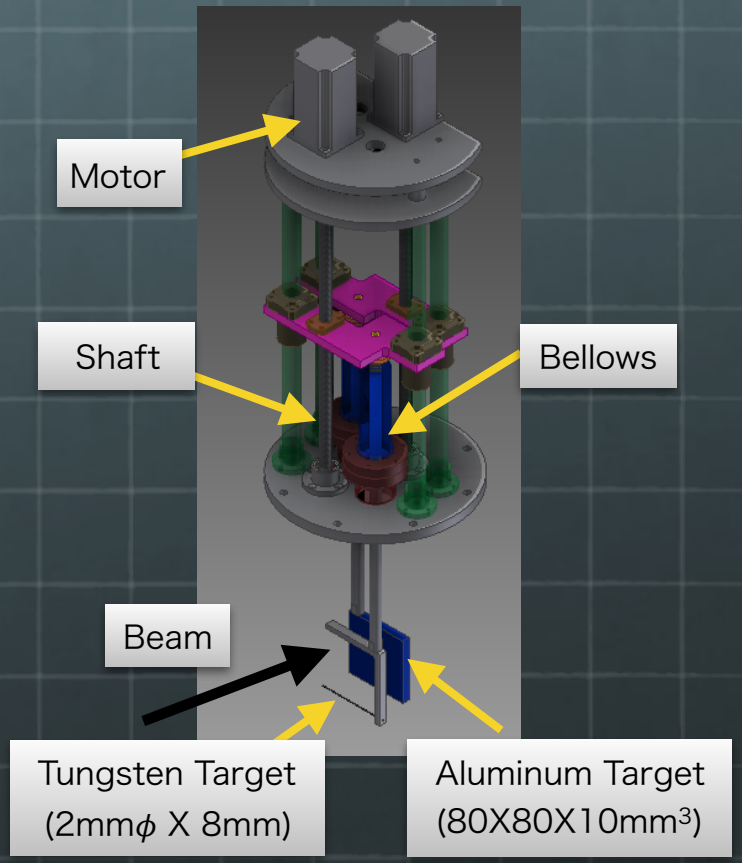


- Single neutron produce two clusters
  - Newly founded background source
  - Studied by using aluminum target data

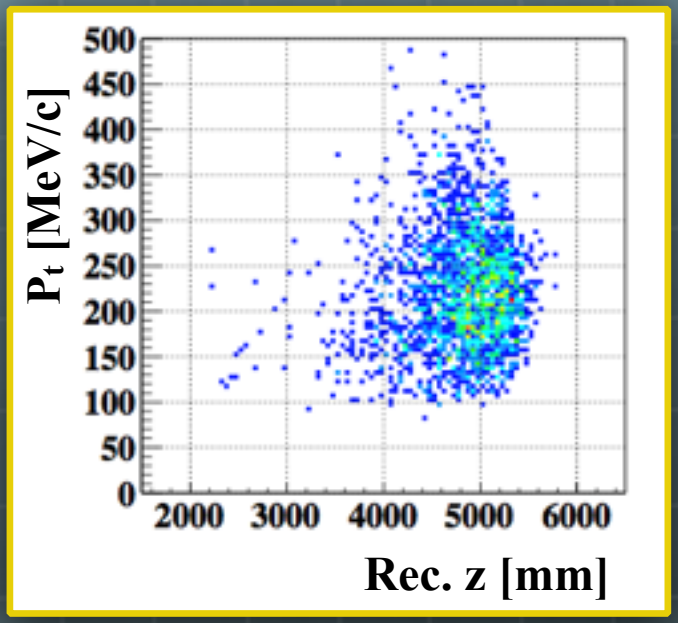
Halo neutron events

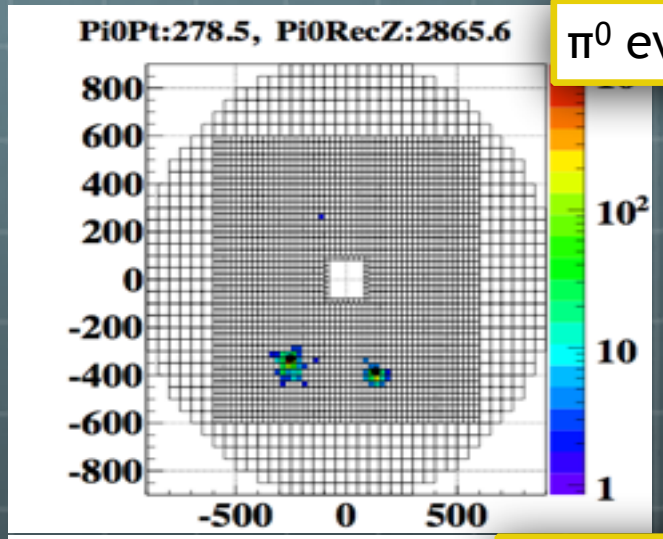
- To reduce scattering source
- To take data for enhanced neutron events



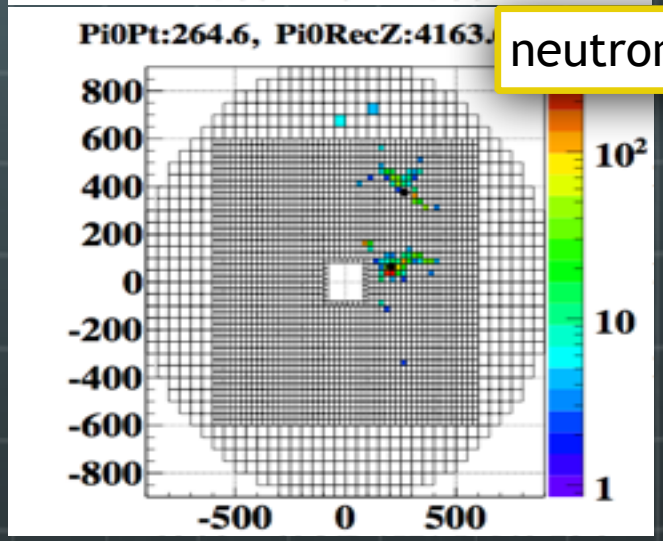


Enhanced neutron events





π^0 event



neutron event

- 70-hour data taking with Al-target (>15 times more than May 2013)
- To study cluster and pulse shape in the calorimeter
- To develop a method to discriminate neutron induced events from the π^0 events

Research plan

- Goal : To understand characteristic of the neutron background

  To estimate background level based on M.C.

- (Not to aim : To compare the M.C. results with real data)
  - We know that the M.C. couldn't reproduce the data well.

Procedure

- To generate neutron and gamma events
  - To understand mechanism to produce hadronic shower
  - compare gamma and neutron events
- To make clustering and gamma
- Select two-gamma events
  - To understand mechanism of two-gamma events