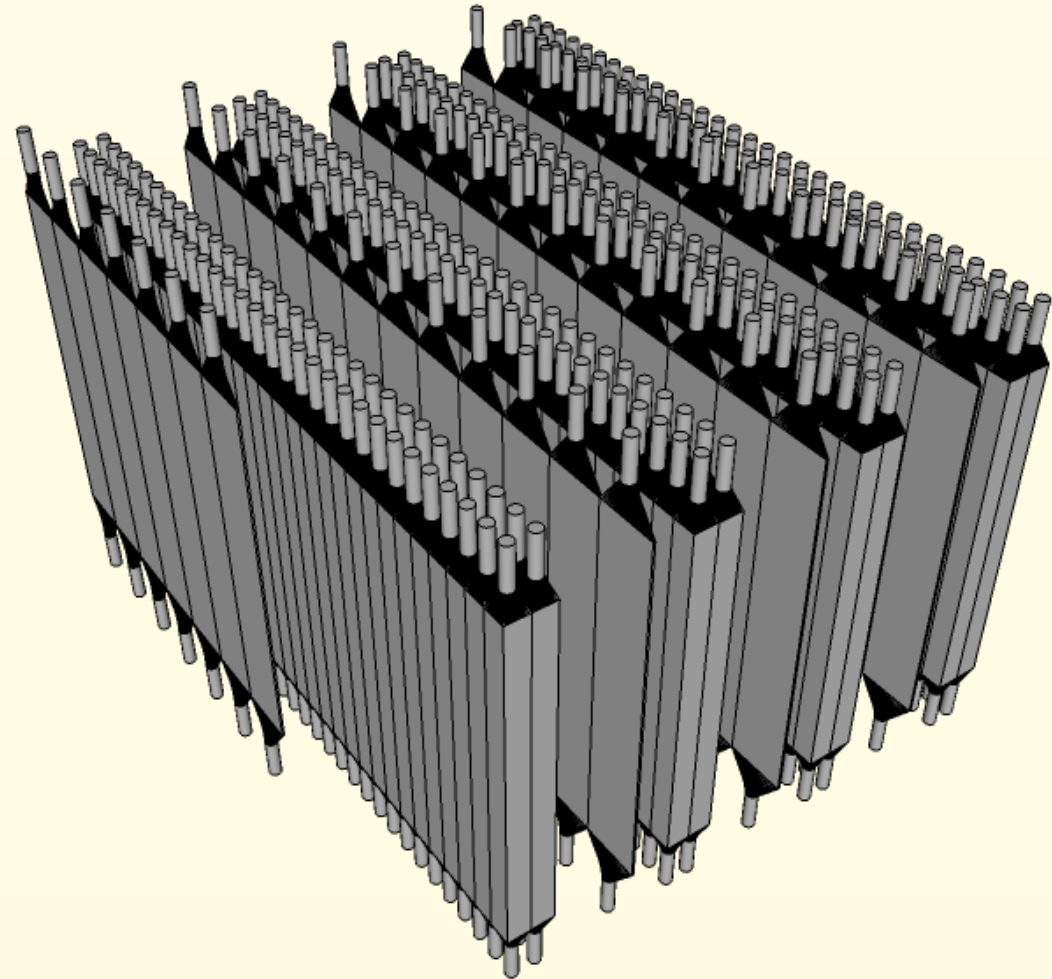


NEBULA

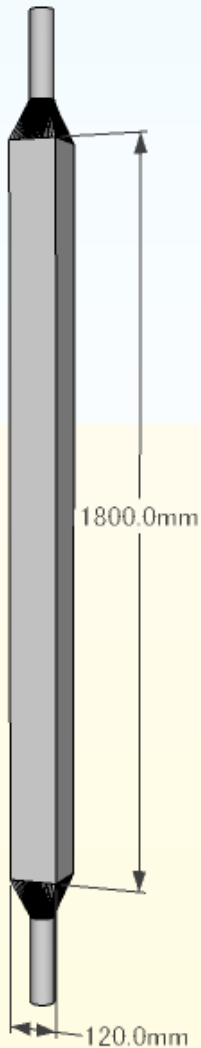
(Neutron-detection system for Breakup of Unstable-Nuclei with Large Acceptance)

- 240 Neutron counters (60 modules x 4 stacks)
- 48 VETO counters

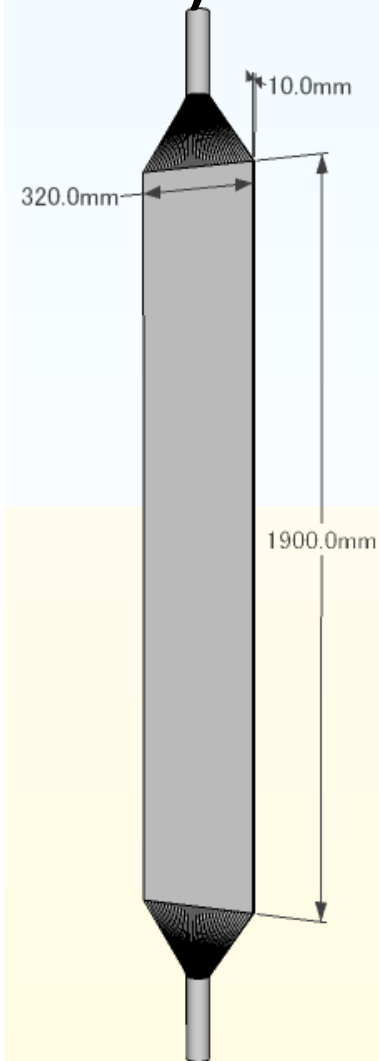


NEBULA

(Neutron-detection system for Breakup of Unstable-Nuclei with Large Acceptance)



- Neutron counter
 - scintillator
 - BC408
 - 12cm x 12cm x 180cm
 - PMT
 - R7724ASSY (both ends)
 - vertical position is determined by time difference
- VETO counter
 - 1cm-thick scintillator
 - used to identify the charged particles

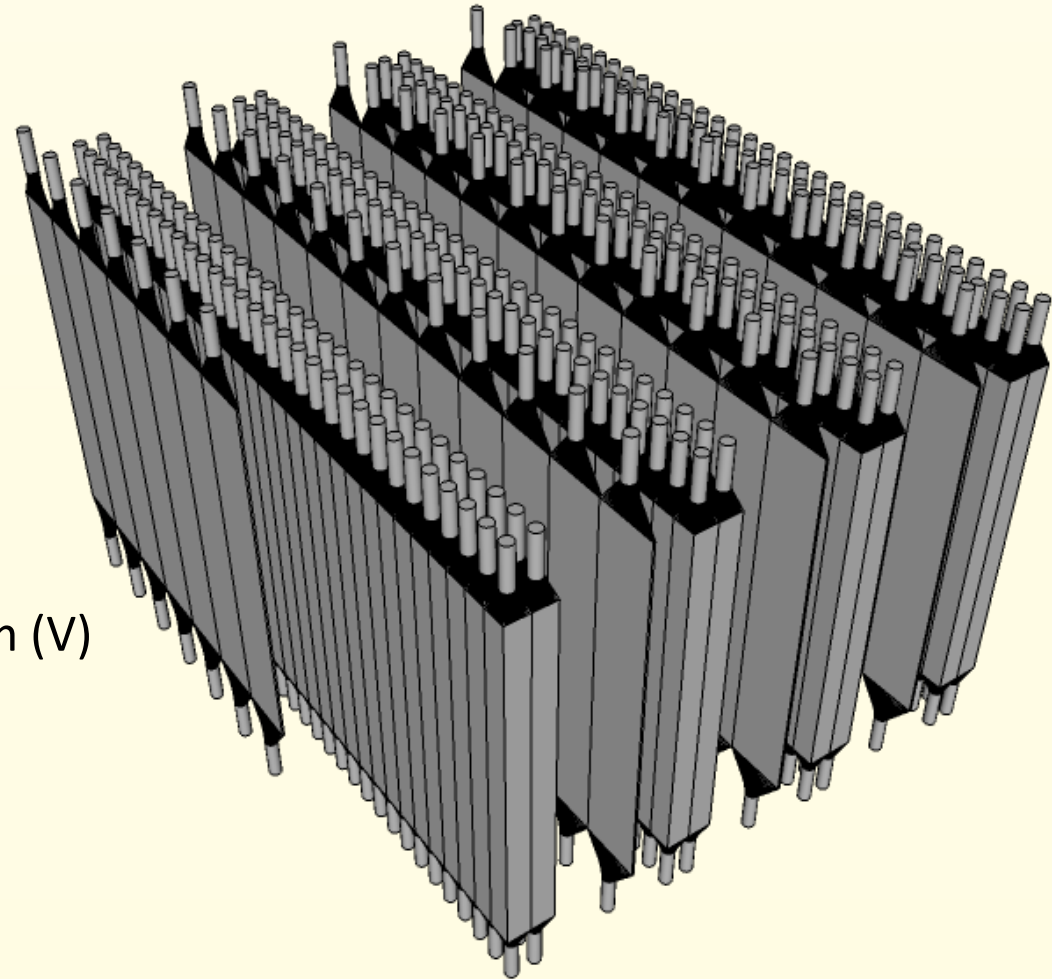


NEBULA

(Neutron-detection system for Breakup of Unstable-Nuclei with Large Acceptance)

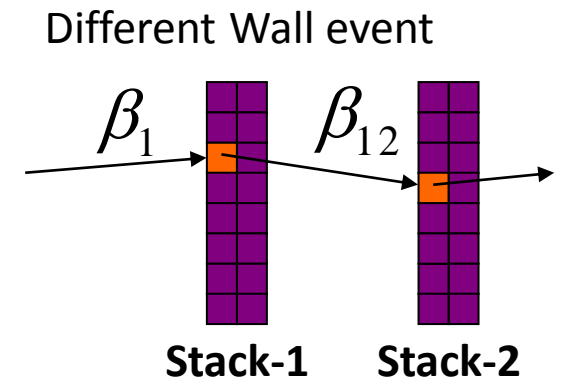
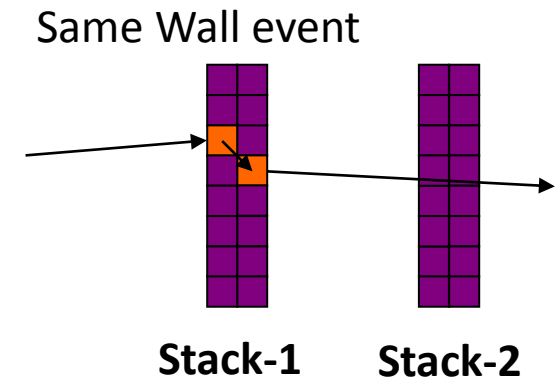
- 240 Neutron counters (60 modules x 4 stacks)
- 48 VETO counters

- High efficiency
 - ~70% for 1n detection
- Large acceptance
 - effective area : 3.6m (H) x 1.8m (V)
 - $-10^\circ < \theta_H < 10^\circ$, $-5^\circ < \theta_V < 5^\circ$
- Multi-neutron detection
 - aiming at 4n detection



Multi-neutron detection (example: 2n case)

- crosstalk ... more than 2 hits caused by 1n
 - should be eliminated for multi-neutron detection
→ kinematical condition is used to reject the crosstalk
 - Same wall event → position information
 - 2 hits are clustered and are regarded as 1 hit if positions are close
 - lose efficiency for small E_{rel}
 - Different wall event → velocity information
 - the event is true if $\beta_{12} > \beta_1$
 - because crosstalk neutron must be slow
 - can measure up to $E_{rel} \sim 0$



■ hit detector

Photo

