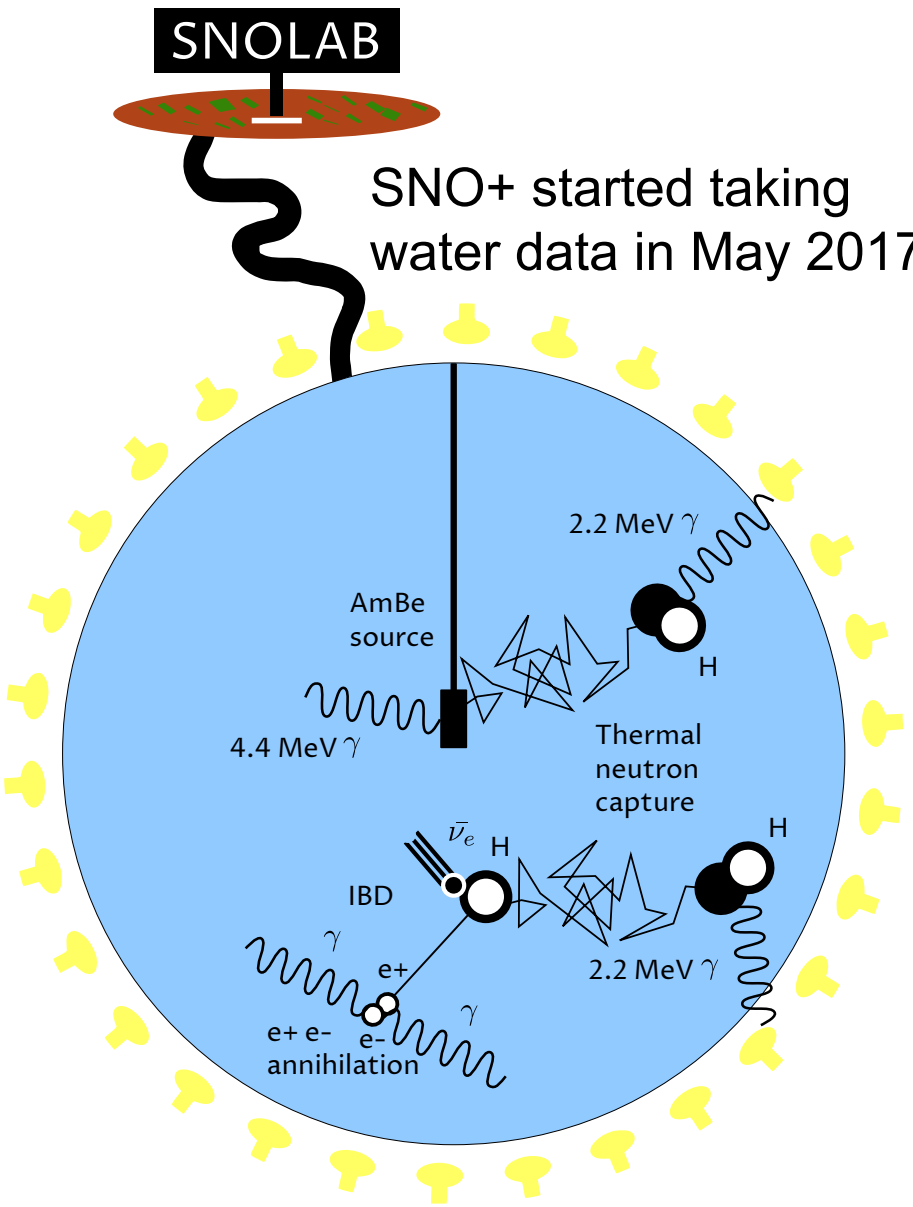
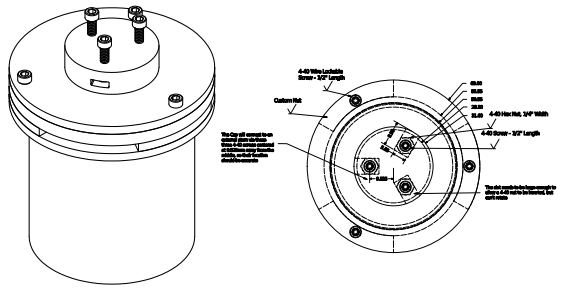
Neutron detection in the SNO+ water phase



AmBe calibration in Jan. 2018

- Measuring the neutron capture signal
- Low energy calibration



New encapsulation was designed for the source.

~0.5 million coincidence pairs

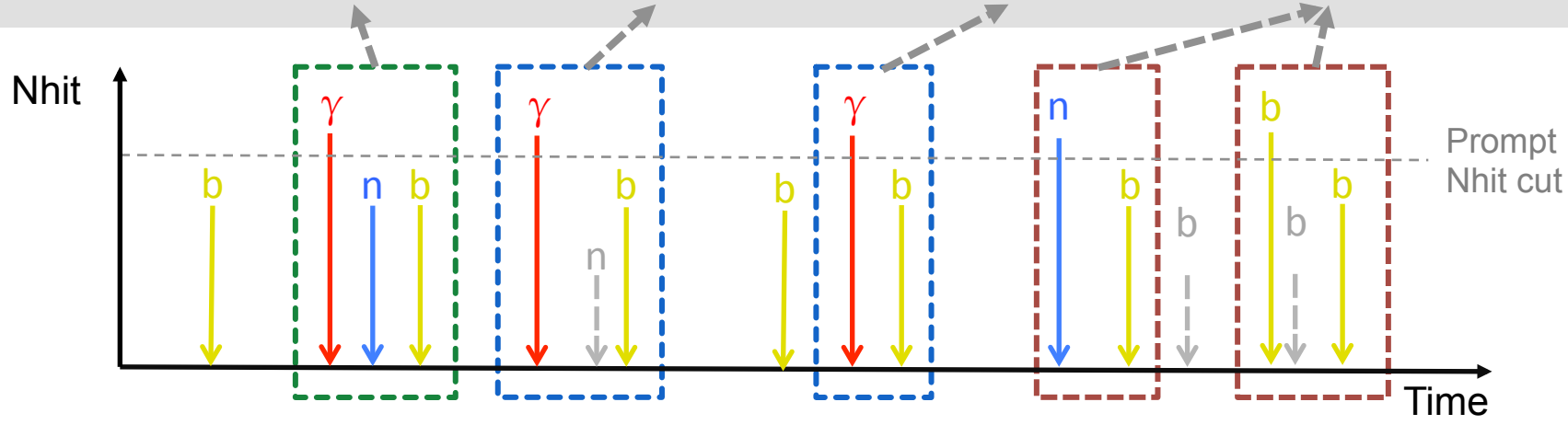
23 detector locations

66 Hz neutron rate

>10 hrs background run

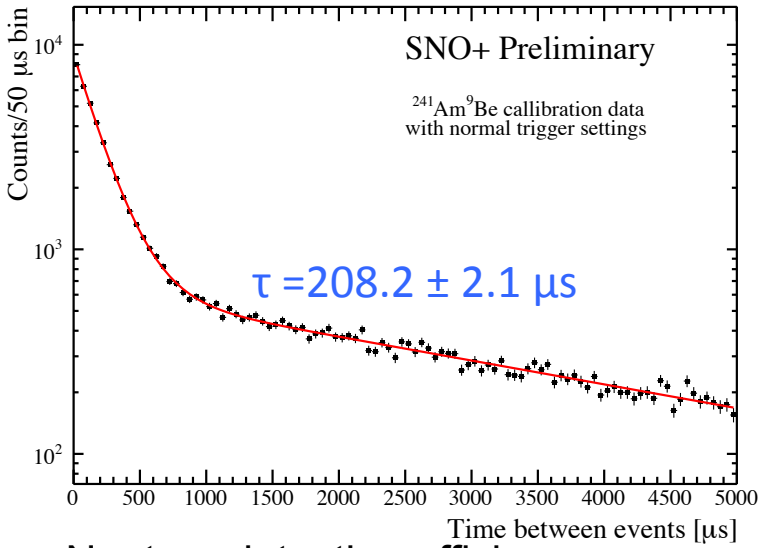
AmBe Calibration

$$F(t) = N \cdot R_1\{P\varepsilon \cdot \lambda e^{-\lambda t} \cdot e^{-R_2 t} + P\varepsilon \cdot R_2 e^{-R_2 t} \cdot e^{-\lambda t} + (1-P) \cdot R_2 e^{-R_2 t} + P(1-\varepsilon) \cdot R_2 e^{-R_2 t}\}$$



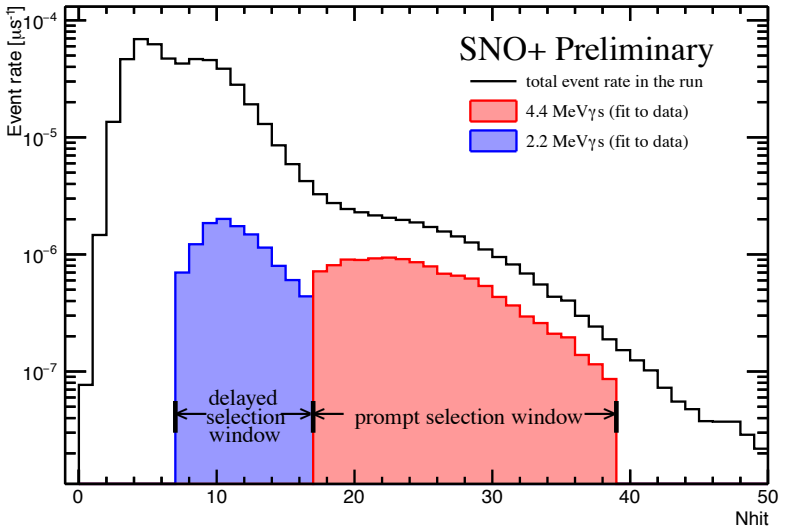
$$P = \frac{\text{number of 4.4 MeV } \gamma}{\text{number of prompt candidates}}$$

$$\varepsilon = \frac{\text{number of correlated neutrons in the delayed candidates}}{\text{total number of correlated neutrons generated}}$$



Neutron detection efficiency

ε > 46% at the center of the detector.



The Nhits distributions are extracted free from background.