



# nEDM@SNS Experiment: Neutron Polarization and Transmission Measurements<sup>§</sup>

Kavish Imam from the nEDM@SNS Collaboration

## nEDM@SNS Experiment:

The primary method to determine EDM is to measure Larmor precession frequency of the neutron under the application of electric and magnetic fields:

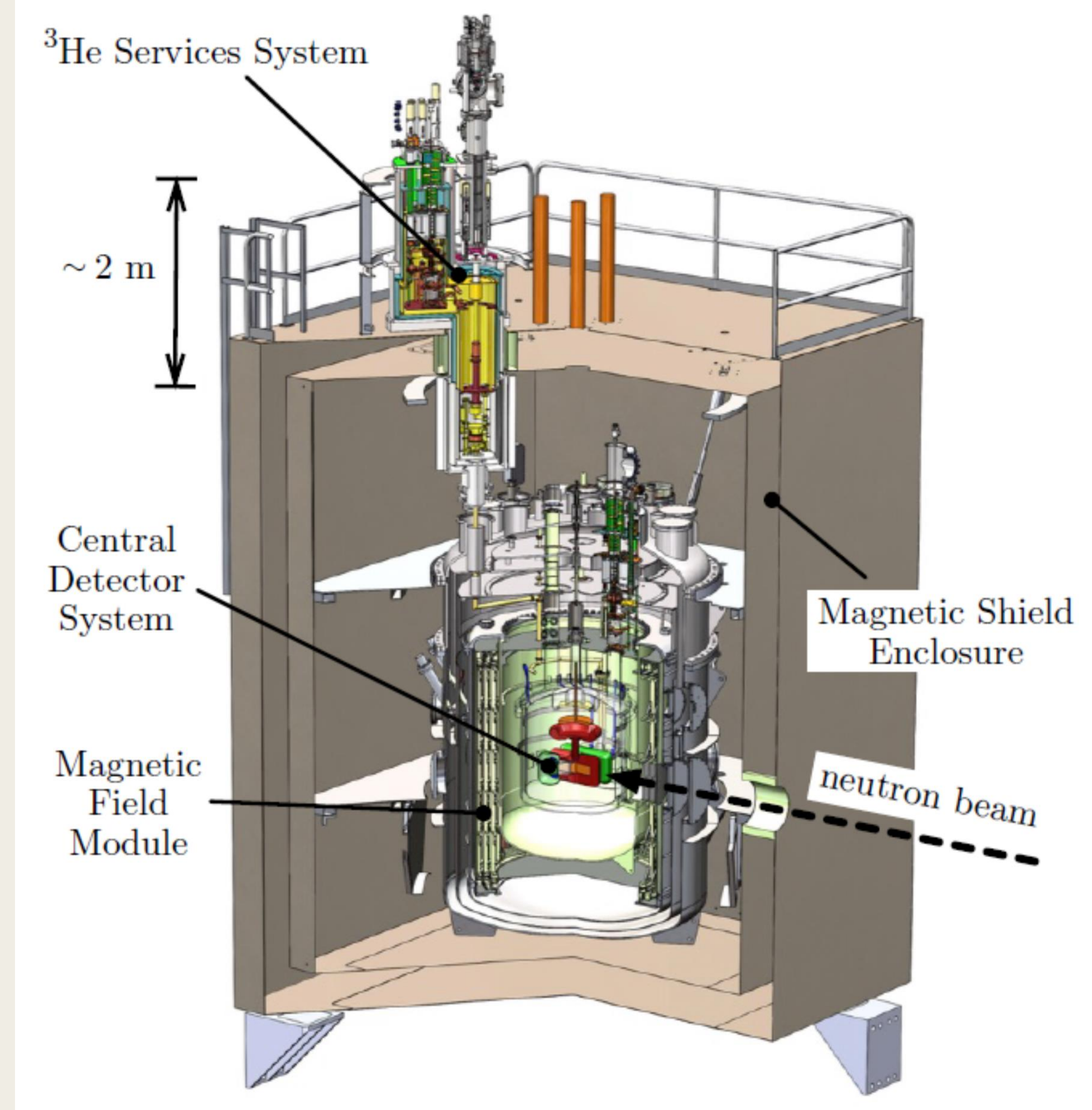
$$\omega_n = \frac{-2(\mu_n B_0 \pm d_n E_0)}{\hbar}$$

Statistical Sensitivity  $\rightarrow \sigma_{d_n} \simeq \frac{1}{E_0 \tau \sqrt{N}}$

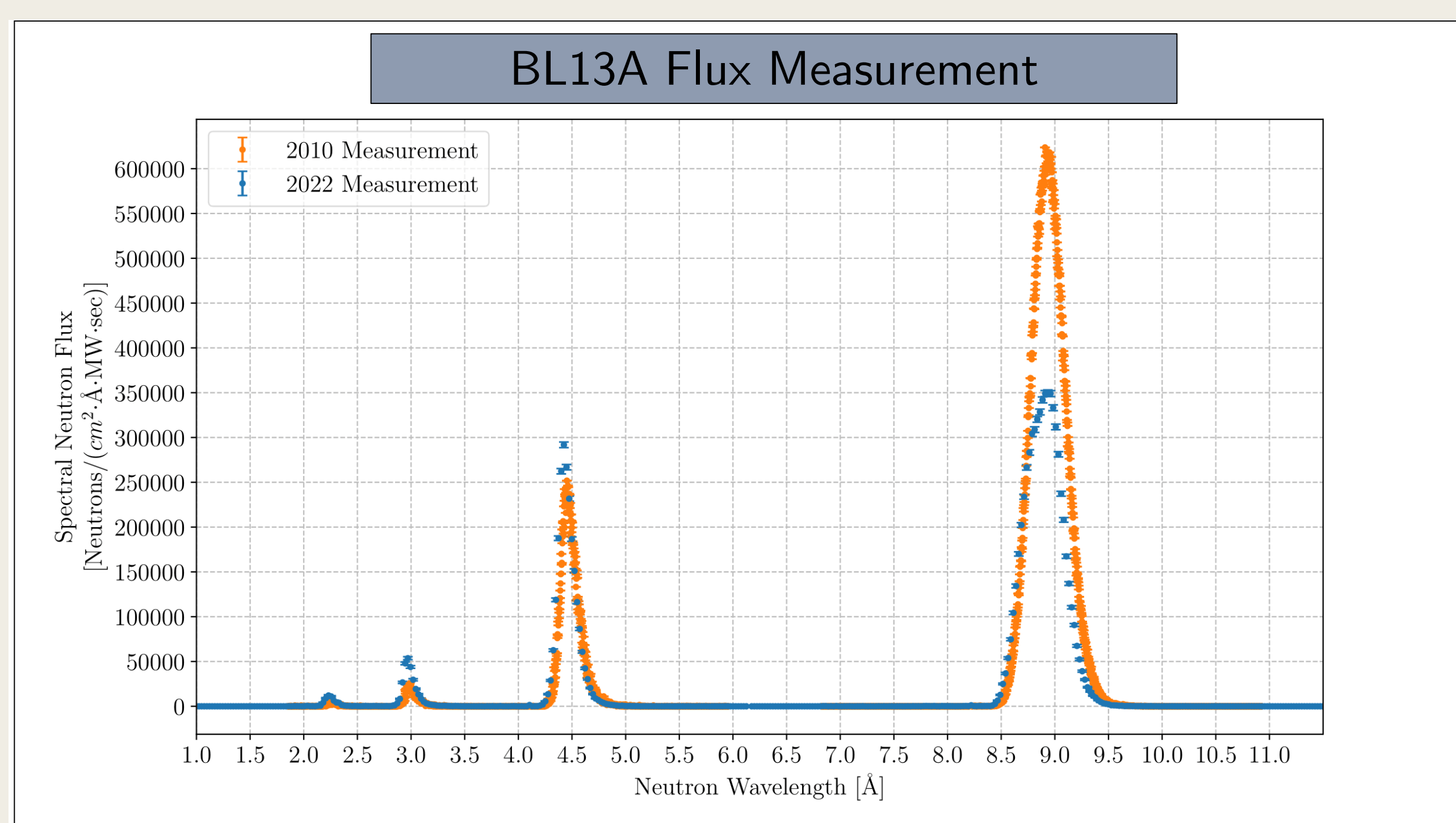
$\xrightarrow{\text{E-field}}$        $\xrightarrow{\text{Measurement Time}}$        $\xrightarrow{\text{\# of Neutrons}}$

Key features of nEDM@SNS experiment:

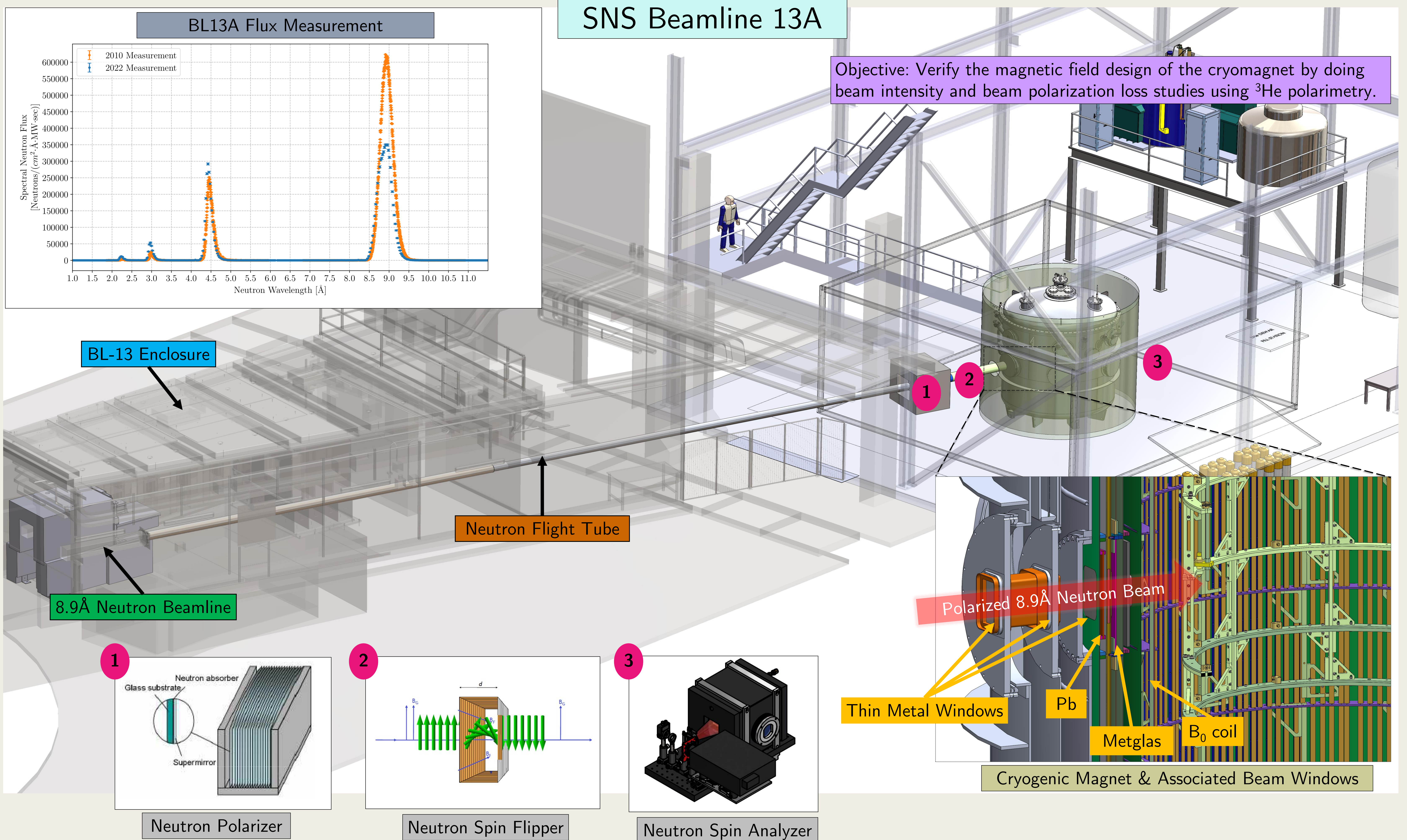
- In situ production of UCN via superthermal process in superfluid  $^4\text{He}$
- High electric fields tolerable in superfluid  $^4\text{He}$ .
- Use of polarized  $^3\text{He}$  as a comagnetometer.
- Use of polarized  $^3\text{He}$  for in situ live neutron precession analysis.
- Set new limit on the neutron's EDM to  $10^{-28}$  e-cm.



## Polarization & Transmission Measurements (R&D):



### SNS Beamline 13A



Kavish Imam [simam@vols.utk.edu](mailto:simam@vols.utk.edu)

<sup>§</sup> The work presented is in part supported by U.S. D.O.E award number DE-FG02-03ER41258 and D.O.E Office of Science, WDTS-SCGS program under contract number DE-SC0014664.