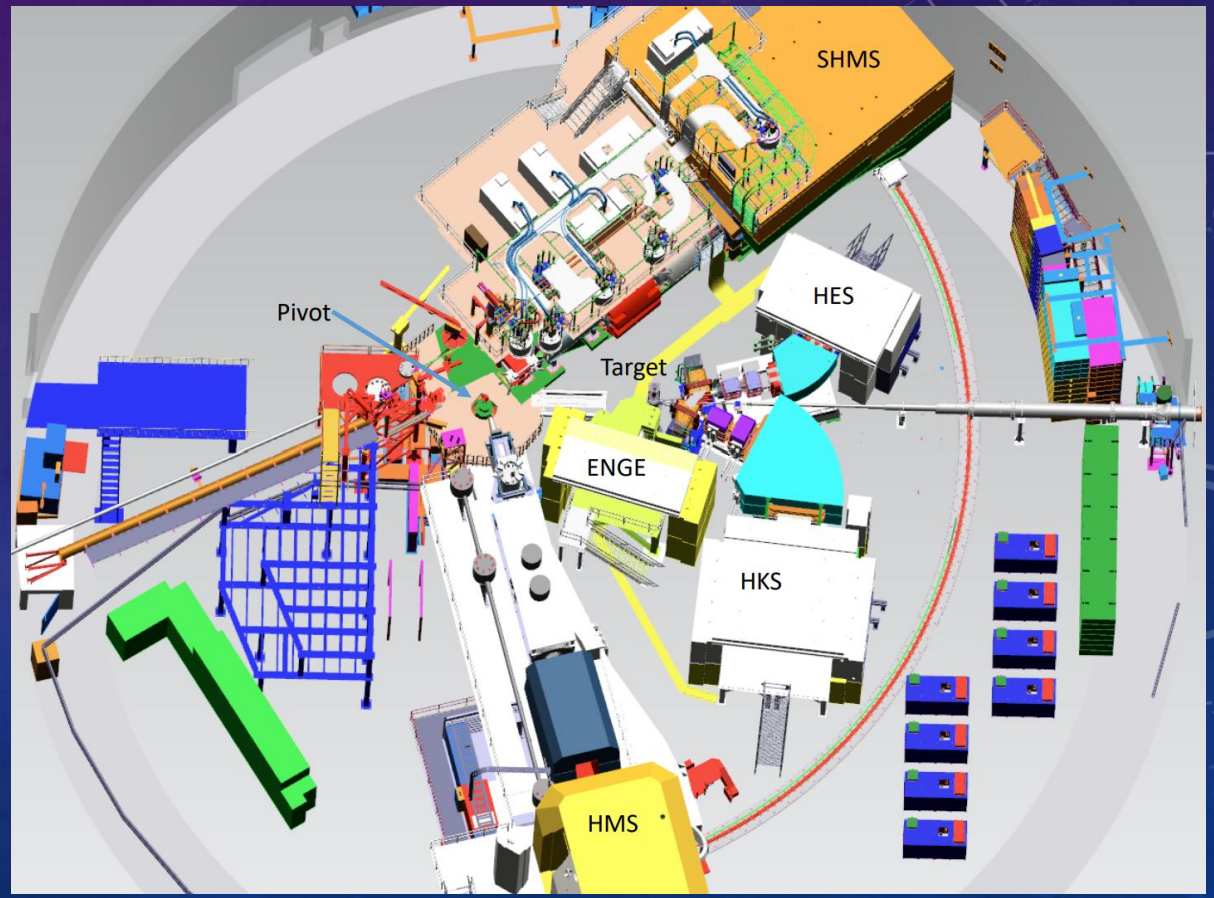
May 15–16, 2025
Jefferson Lab

THE UNIVERSITY OF TOKYO

QNSI
Quark Nuclear Science Institute, UTokyo

JLab Hypernuclear Collaboration Meeting

S.N.Nakamura Univ. of Tokyo



Upcoming Hypernuclear Experiments at JLab

Experiments

- **E12-24-003** "Studying Lambda interactions in nuclear matter with the ^{208}Pb(e,e'K^{+})$^{208}_{\Lambda}$Tl reaction" **[42 PAC days]**
- **E12-24-004** "Study of charge symmetry breaking in p-shell hypernuclei" **[24 PAC days]**
- **E12-24-011** "Study of a triaxially deformed nucleus using a Lambda particle as a probe" **[28 PAC days]**
- **E12-24-013** "An isospin dependence study of the Lambda-N interaction through the high precision spectroscopy of Lambda hypernuclei" **[55 PAC days]**

Run Group Experiment (Parasitic Experiment)

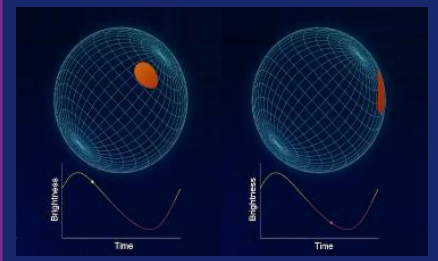
- **E12-15-008A** "High-resolution spectroscopy of light hypernuclei with the decay-pion spectroscopy"

The First Hypernuclear Experiment After the Tritium Campaign,
Conducted Under the Unified Hall-A and Hall-C Hypernuclear Collaboration
— Launching JLab's Largest Hypernuclear Experimental Campaign

In this two days collaboration meeting, significance and impact of the hypernuclear project at JLab will be discussed including two theoretical seminars. Preparation updates after the ERR in last November, will be also shown.

PROBLEMS WE ARE CHALLENGING NOW

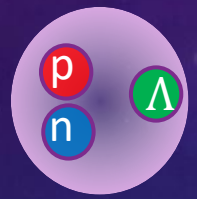
Recent astronomical observations



Hypertriton Puzzle

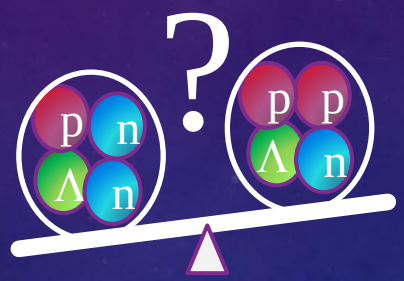
E12-15-008A
E12-20-013A

Shallow bound
Short lifetime



CSB of Λ Hypernuclei

E12-24-004



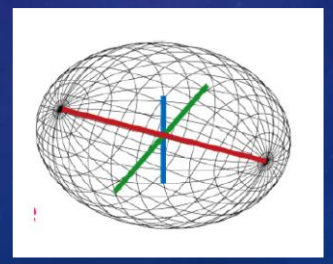
Hyperon Puzzle

E12-24-013

E12-24-003

Why massive NS exists?

A=3
10^{-15} m

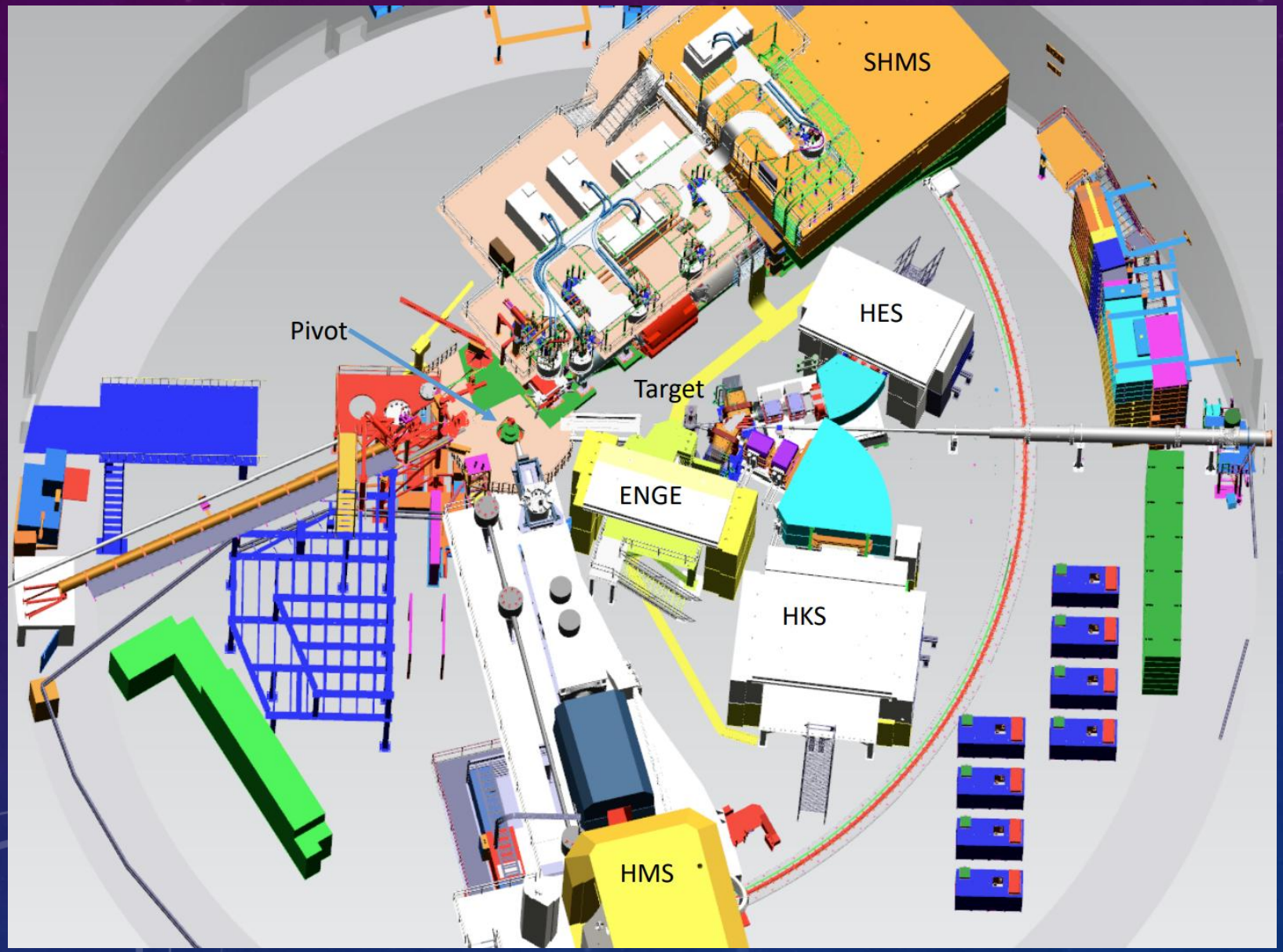


E12-24-011

A~10^{57}
10^{4} m

Λ probe to study shape of deformed nucleus

A single setup for five approved experiments



Today

Spectrometer Systems

Overview of 5 experiments

Theoretical seminars

A. Jinno
Lambda potential in dense nuclear matter from chiral EFT

H. Togashi
Role of hyperon interactions in NS and SN Cores

Finish today's discussion well before Run-a-round !

Tomorrow : Status updates and progress reports

Overview of Spectroscopy System

Convener: Ralph Marinaro (Christopher Newport University)

9:00 a.m. **Overview of HES-HKS System and Commissioning Plan**
Speaker: Dr Toshiyuki Gogami (Kyoto University)

9:20 a.m. **Overview of ENGE System and Commissioning Plan**
Speaker: Dr Sho Nagao (The University of Tokyo)

Preparation Status and Discussion

Conveners: Dr Bishnu Pandey (Virginia Military Institute), Dr Sho Nagao (The University of Tokyo)

9:45 a.m. **Test plan for wire chambers at ESB**
Speaker: Liguang Tang (Hampton University/JLab)

9:57 a.m. **New Water Cherenkov Detector for Proton Rejection**
Speaker: Mr Kaito Higashimoto (The University of Tokyo)

10:09 a.m. **HES-HKS simulation**
Speaker: Mr Ravindu Kumaragamage (Hampton University)

10:41 a.m. **Cosmic-Ray Test of Aerogel Cherenkov Counters by FADC**
Speaker: Mr Teppei Iwamoto (Kyoto University)

10:53 a.m. **HES-HKS simulation**
Speaker: Mr Tatsu Ishige (Tohoku University)

11:05 a.m. **Scintillation Fiber Detector Used for Focal Plane Detection**
Speaker: Mr Kotaro Nishi (The University of Tokyo)

11:17 a.m. **Time-Of-Flight Detector for ENGE and SIPM radiation test**
Speaker: Mr Ken Nishida (The University of Tokyo)

11:29 a.m. **Radiation Simulations By Geant4 and FULKA**
Speaker: Mr Jin Takahashi (The University of Tokyo)

Preparation Status and Discussion

Conveners: Guido Urciuoli (INFN), Pete Markowitz (Florida International University)

1:20 p.m. **Engineering for Hypernuclear Spectrometer System** 45m

1. Floor plan and design overview (locations/supports-platforms/shielding),
2. Design and construction status/plan (including sieve slits/collimators and target ladder extraction/Enge vacuum box),
3. PS/LCW checklist and plan,
4. Cable routing,
5. Stray field calculation (issue/solution/result),
6. Installation plan/estimated timeline

Speakers: Jamie Shiflett, Steven Lassiter (JLab)

2:05 p.m. **Target System for Hypernuclear Spectroscopy** 20m
Speaker: David Meekins (Jefferson Lab)

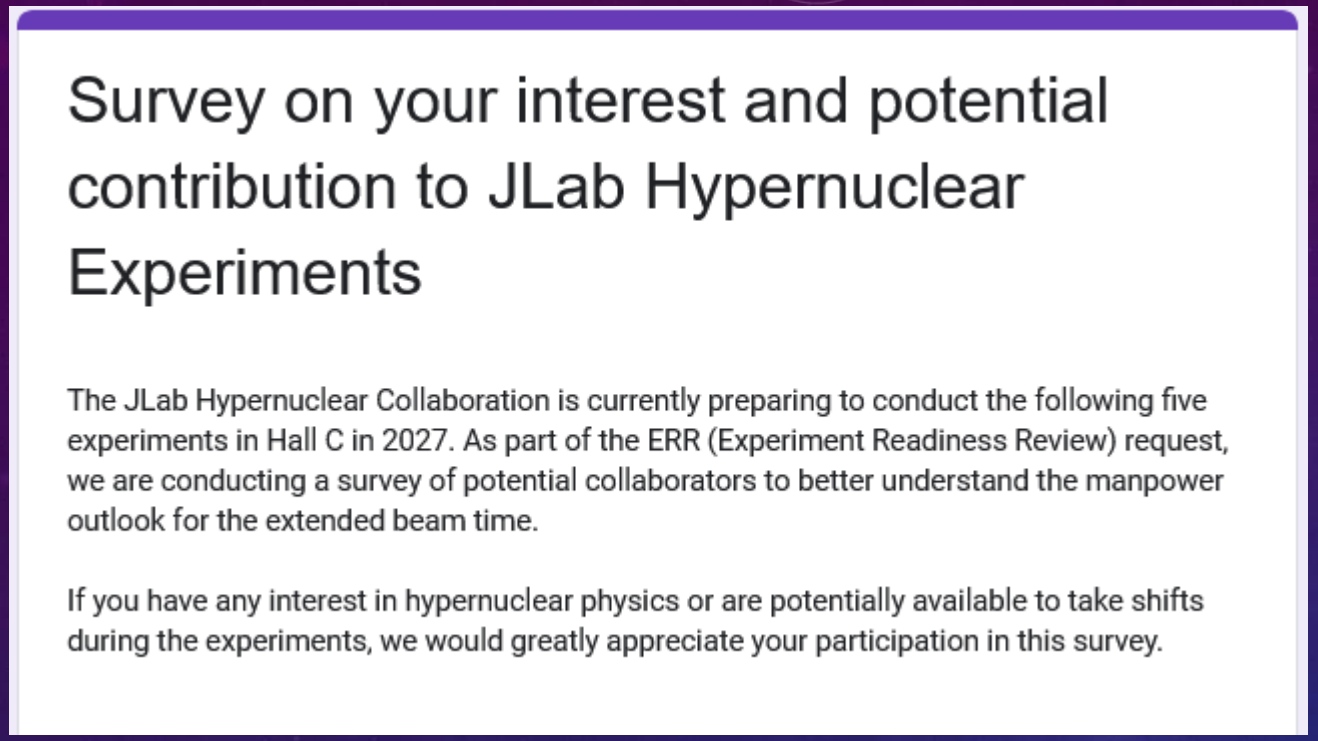
2:25 p.m. **Hall C Beamline + SLI Overview** 20m
Speaker: Dave Gaskell (Jefferson Lab)

3:15 p.m. **DAQ System and Preparation Plan**
Speaker: Alexandre Camsonne (Jefferson Laboratory)

3:35 p.m. **Online and Offline Analysis Software**
Speaker: Sanghwa Park (Jefferson Lab)

3:55 p.m. **ePass Policy and List of Required Documents**
Speaker: William Henry (Jefferson Lab)

4:15 p.m. **Free discussion**



Survey on your interest and potential contribution to JLab Hypernuclear Experiments

The JLab Hypernuclear Collaboration is currently preparing to conduct the following five experiments in Hall C in 2027. As part of the ERR (Experiment Readiness Review) request, we are conducting a survey of potential collaborators to better understand the manpower outlook for the extended beam time.

If you have any interest in hypernuclear physics or are potentially available to take shifts during the experiments, we would greatly appreciate your participation in this survey.

We performed a survey on potential collaborators

We have responses from 21 PIs.

5 PIs have Ph-D candidate
Another 5 PIs may have.

Number of shift-taker of the responded PIs group

41 researchers from the responding PI group will take part in shift work for the experiment.

We have a good starting point now.
By the time of beamtime, we expect the collaboration to grow further.