PROJECT UPDATE

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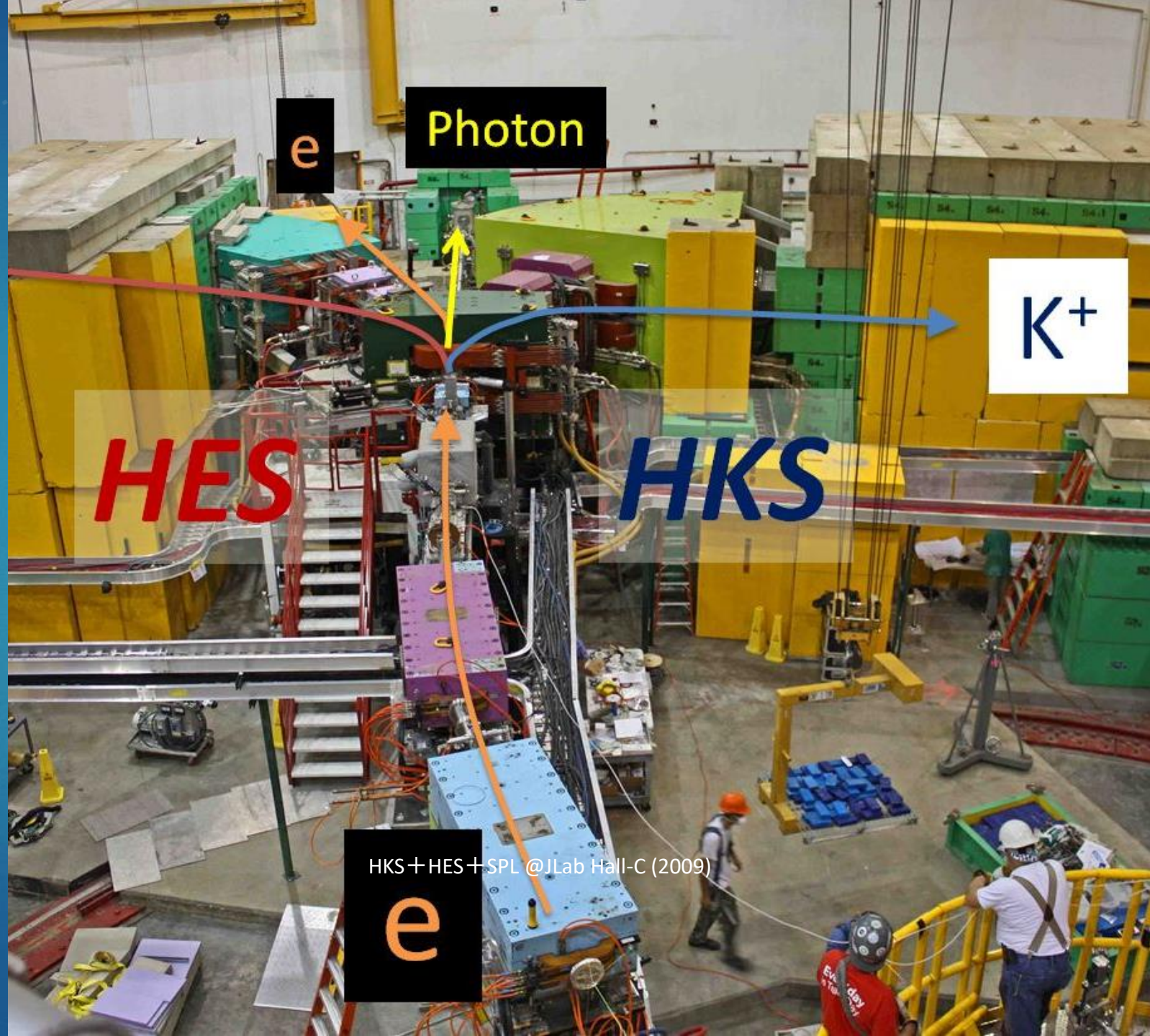
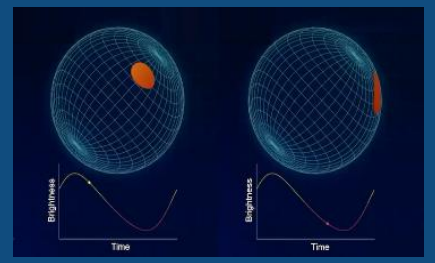


HKS＋HES＋SPL @JLab Hall-C (2009)

PROBLEMS WE ARE CHALLENGING NOW

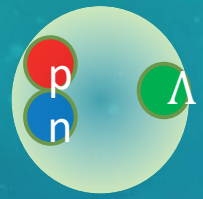
Recent astronomical observations



Hypertriton Puzzle

JLab
E12-19-002

Shallow bound
Short lifetime

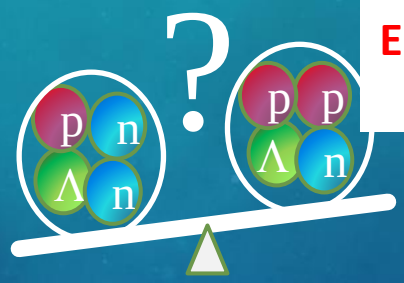


${}^{3}_{\Lambda}n$ Puzzle

Bound?
Resonance?
Not Exist?

JLab
E12-17-003

CSB of Λ Hypernuclei



JLab
E12-15-008
E12-20-013

Hyperon Puzzle

Why massive NS exists?

A=3
10^{-15} m

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

HYPERNUCLEAR experiments at JLab

E89-009 (2000) : Existing spectrometers,
SOS + Enge

HNSS
Hall-C

Proof of Principle

Hall-A Hypernucl.

E01-011 (2005) : HKS
Construction of HKS, Tilt Method
Λ, Σ^0, $^{7}_{\Lambda}$He, $^{12}_{\Lambda}$B, $^{28}_{\Lambda}$Al
Light Hypernuclei

E94-107 (2004-5)
Two HRSs + SC Septum
Λ, Σ^0, $^{9}_{\Lambda}$Li, $^{12}_{\Lambda}$B, $^{16}_{\Lambda}$N
Light Hypernuclei

E05-115 (2009) : HKS-HES
HKS+HES, new Chicane beamline, Splitter
Λ, Σ^0, $^{7}_{\Lambda}$He , $^{9}_{\Lambda}$Li, $^{12}_{\Lambda}$B, $^{52}_{\Lambda}$V
Light to medium-heavy Hypernuclei

E12-17-003 (2018) :
HRS+HRS, ^{3}H Target
$nn\Lambda$ study

E12-15-008, E12-20-013, E12-19-002
HKS+HRS +PCS ^{40,48}Ca , ^{208}Pb, ^{3,4}He
New JLab Hypernuclear Exp. in Hall A

HYPERNUCLEAR experiments at JLab

E89-009 (2000) : Existing spectrometers, SOS + Enge

Proof of Principle

HNSS

Hall-C

Hall-A Hypernucl.

E01-011 (2005) : HKS

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E05-115 (2009) : **HKS-HES**

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Light to medium-heavy Hypernuclei

E12-17-003 (2018) :

HRS+HRS, ^{3}H Target

$nn\Lambda$ study

E12-15-008, E12-20-013, 3 LoIs

HKS+HRS +PCS+ENGE ^{40,48}Ca , ^{208}Pb ^{6}Li, ^{9}Be, ^{11}B, ^{27}Al

1st Campaign of new hypernuclear Exp. in Hall C

E12-19-002

^{3,4}He

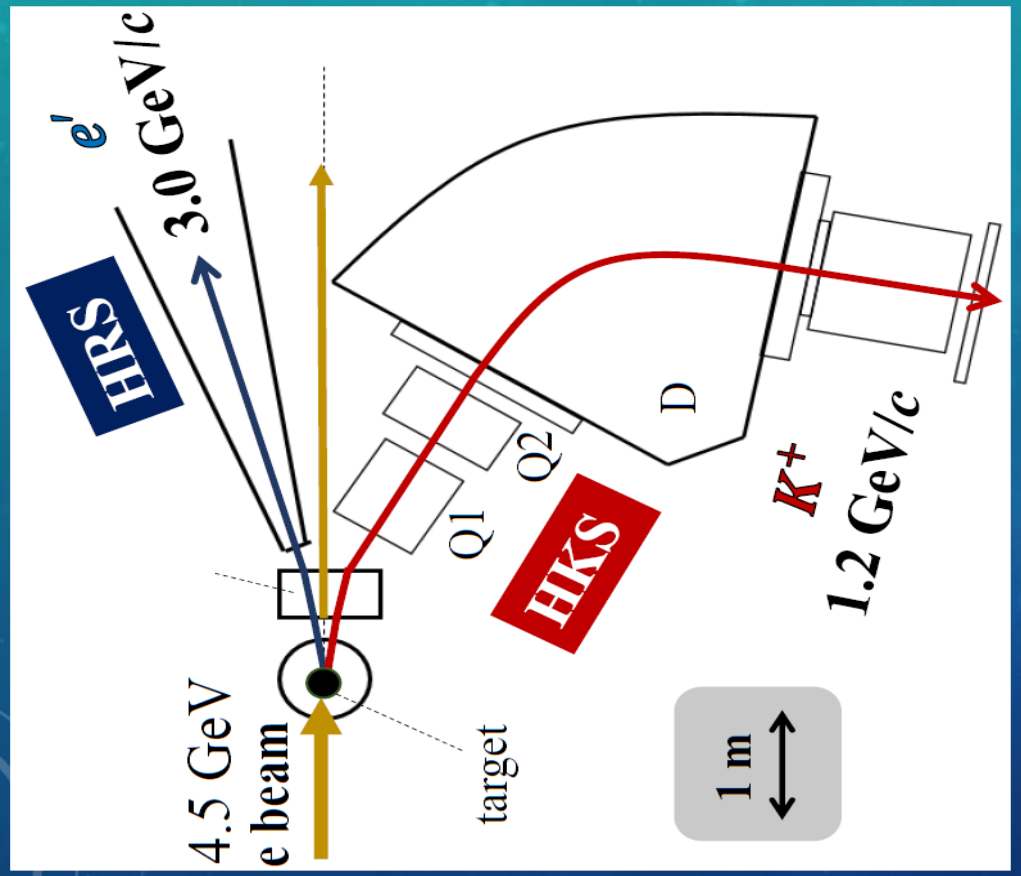
Original Campaign in HALL-A

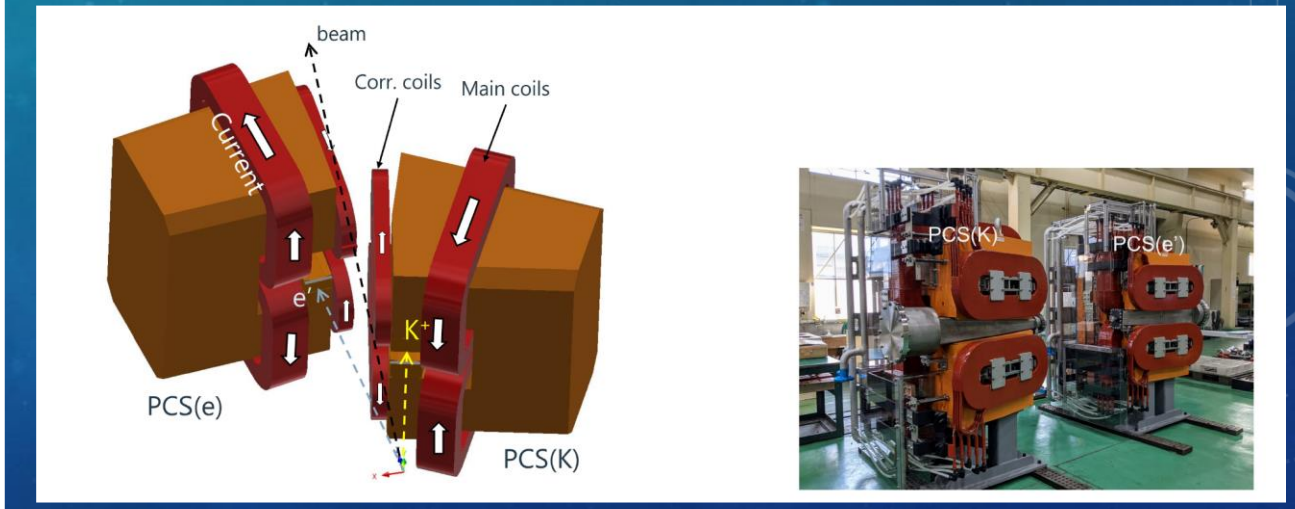
E12-15-008(^{40,48}Ca), ***E12-20-013*** (^{208}Pb)***, E12-19-002*** (^{3,4}He)

Approved three experiments : HKS + HRS + new PCS in **Hall-A**

Higher beam $E_e = 4.5$ GeV, $E'_e = 3.0$ GeV, Vertical bending HRS

Excellent S/N



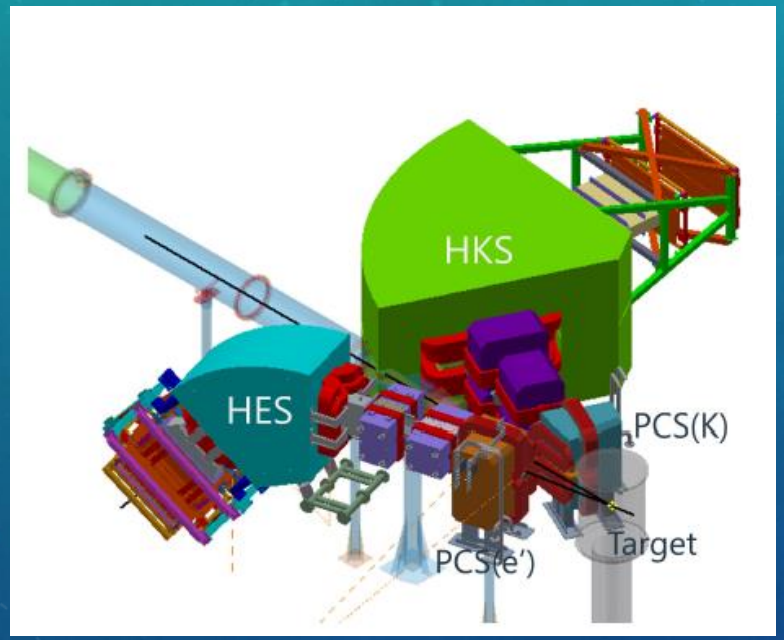


Campaign moved to HALL-C

E12-15-008(^{40,48}Ca), ***E12-20-013*** (^{208}Pb)***, E12-19-002*** (^{3,4}He)

Now we decided to move experiments to Hall-C due to beam availability

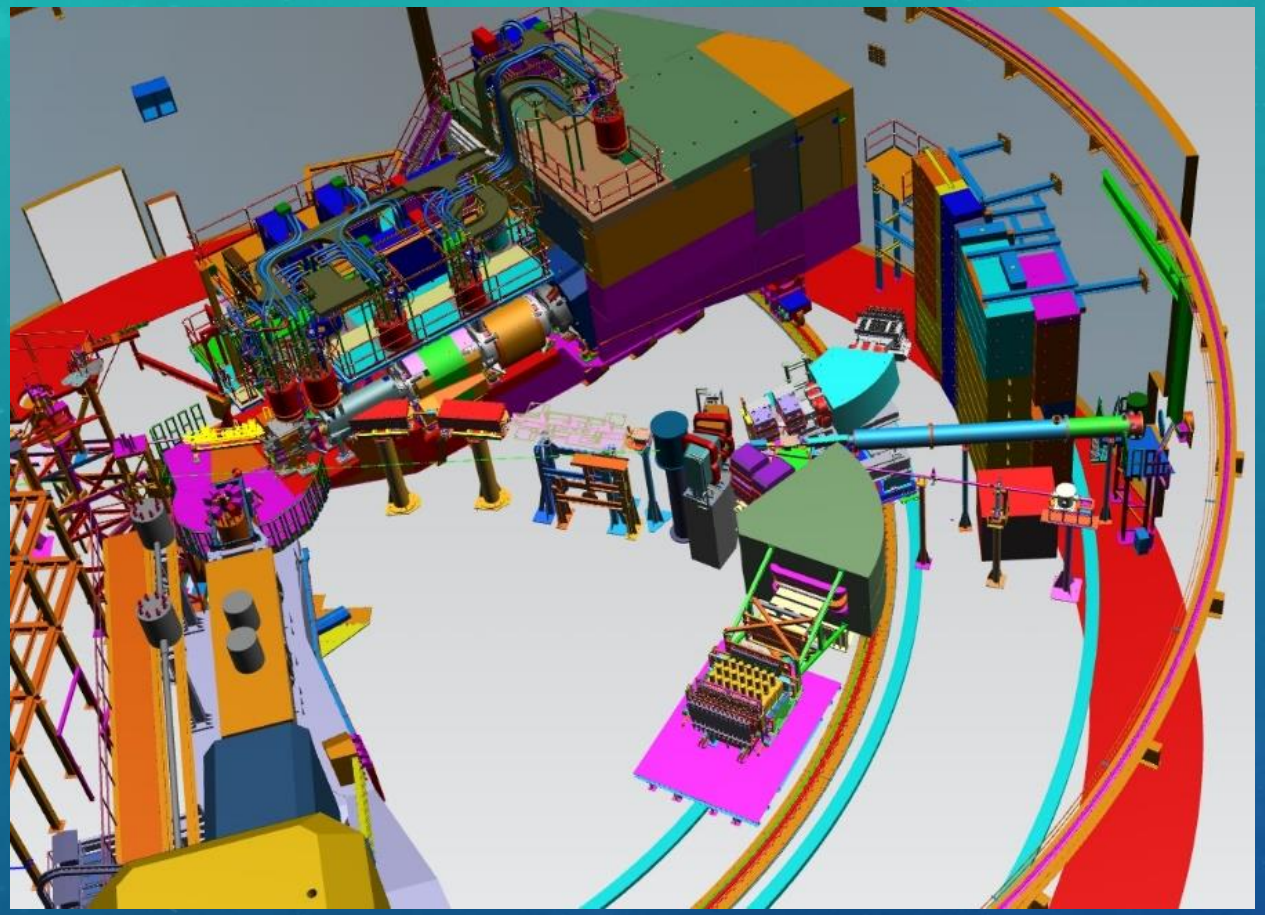
E12-15-008(^{40,48}Ca), ***E12-20-013*** (^{208}Pb) ***Possible with HKS+ HES+ PCS (w/o vertical bending Spectrometer)***



E12-19-002 (^{3,4}He) needs vertical bending spectrometer.

Decided to use **simpler configuration for the next campaign** and Experiments with cryogenic targets : after the first campaign

CAMPAIGN 2027



Already used in Hall-C for E05-115

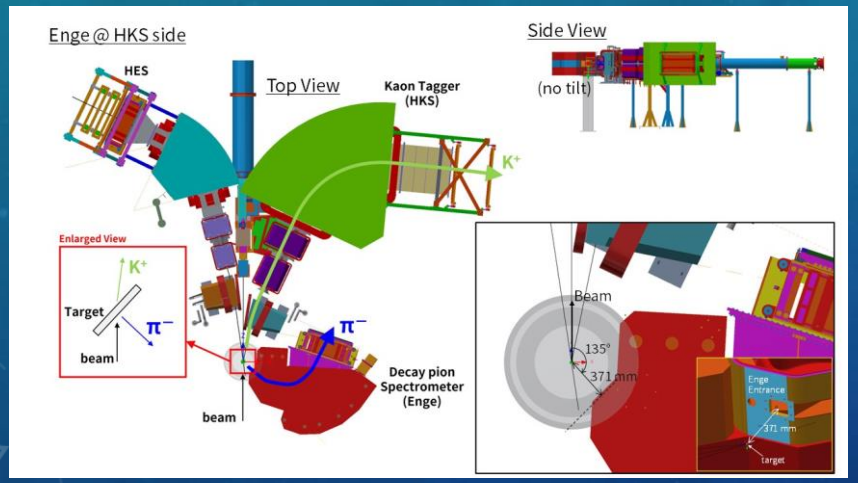
Horizontal HKS
Horizontal HES

New
PCS replaces SPL

Beam	Energy E_e [/(GeV)]	2.240
	Energy stability $\Delta E_e/E_e$	3×10^{-5}
PCS + HES	Central momentum P_e [/(GeV/c)]	0.740
	Central angle $\theta_{e,e'}$ [/(deg)]	8
	Solid angle $\Delta\Omega_{e'}$ [/(msr)]	3.4
	Momentum resolution $\Delta P_{e'}/P_{e'}$	4.4×10^{-4}
PCS + HKS	Central momentum P_K [/(GeV/c)]	1.200
	Central angle θ_K [/(deg)]	15
	Solid angle $\Delta\Omega_K$ [/(msr)]	8.3
	Momentum resolution $\Delta P_K/P_K$	2.9×10^{-4}

HYPERNUCLEAR CAMPAIGN 2027

Exp.6	Targets	Req. BT /PAC Day	Comments
E12-15-008	^{40,48}Ca	28 → 61	Isospin
E12-20-013	^{208}Pb	20	Large mass #
LOI12-23-013	^{6}Li, ^{9}Be, ^{11}B	21.5	CSB
LOI12-23-016	^{27}Al	28	Triaxial deform
LOI12-23-011	Decay π	14	Parallel to all BT



All share HKS+HES+PCS

Decay π needs ENGE

WHAT TO BE DISCUSSED

Preparation Status for the coming ERR

New PCS installation, Layout design, installation plan

Targets and target chamber

Necessary resources including Power Supplies

Beamline and beam diagnose, SLI

Detectors

Sieve Slit

DAQ, Electronics, Cables

Radiation budget

Decay π Experiment : ENGE installation, α Source, New Detectors

Information exchange and plan/schedule update for ERR preparation