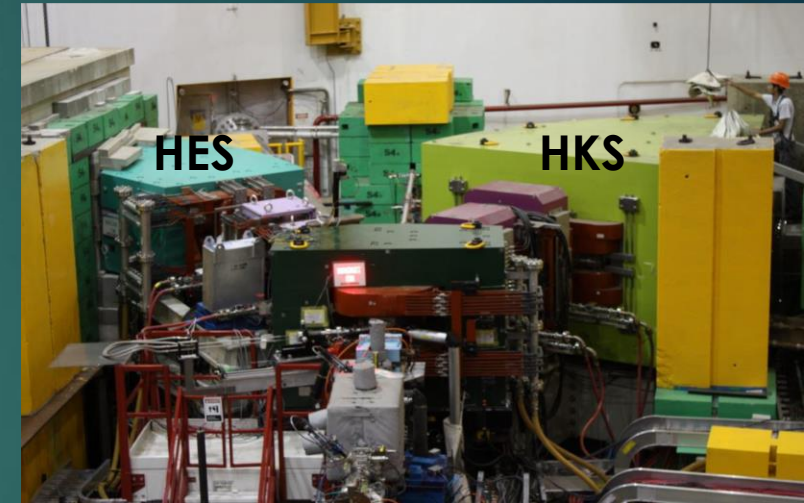


# Overview of all experiments

E05-115 setup in Hall-C



S.N.Nakamura  
Univ. of Tokyo  
JLab Hypernuclear Collaboration

# Approved JLab Hypernuclear Experiments

E12-24-004 Study of CSB in p-shell hypernuclei  
 ${}^6\text{Li} (e, e'K) {}^6_{\Lambda}\text{He}$ ,  ${}^9\text{Be} (e, e'K) {}^9_{\Lambda}\text{Li}$ ,  ${}^{11}\text{B} (e, e'K) {}^{11}_{\Lambda}\text{Be}$

E12-24-011 Study of triaxial deformed nuclei with a  $\Lambda$  probe  
 ${}^{27}\text{Al} (e, e'K^+) {}^{27}_{\Lambda}\text{Mg}$

E12-15-008 Isospin dependence study

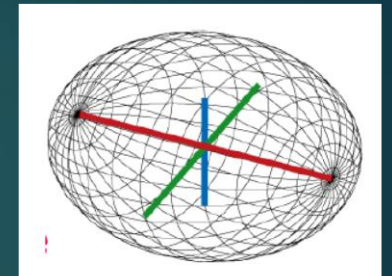
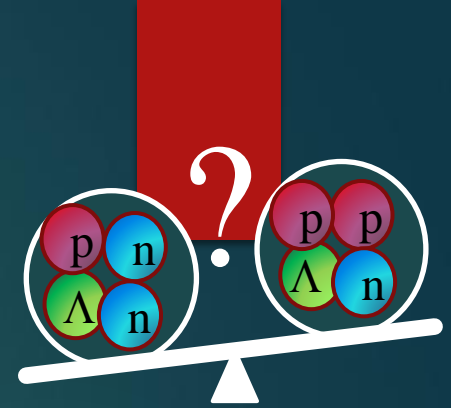
E12-24-013  ${}^{40,48}\text{Ca} (e, e'K^+) {}^{40,48}_{\Lambda}\text{K}$

E12-18-013 Large mass number

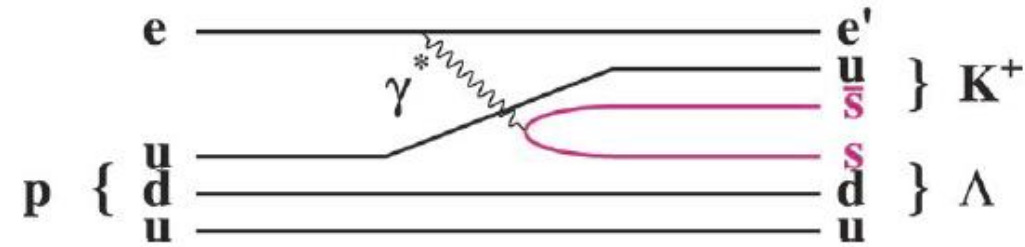
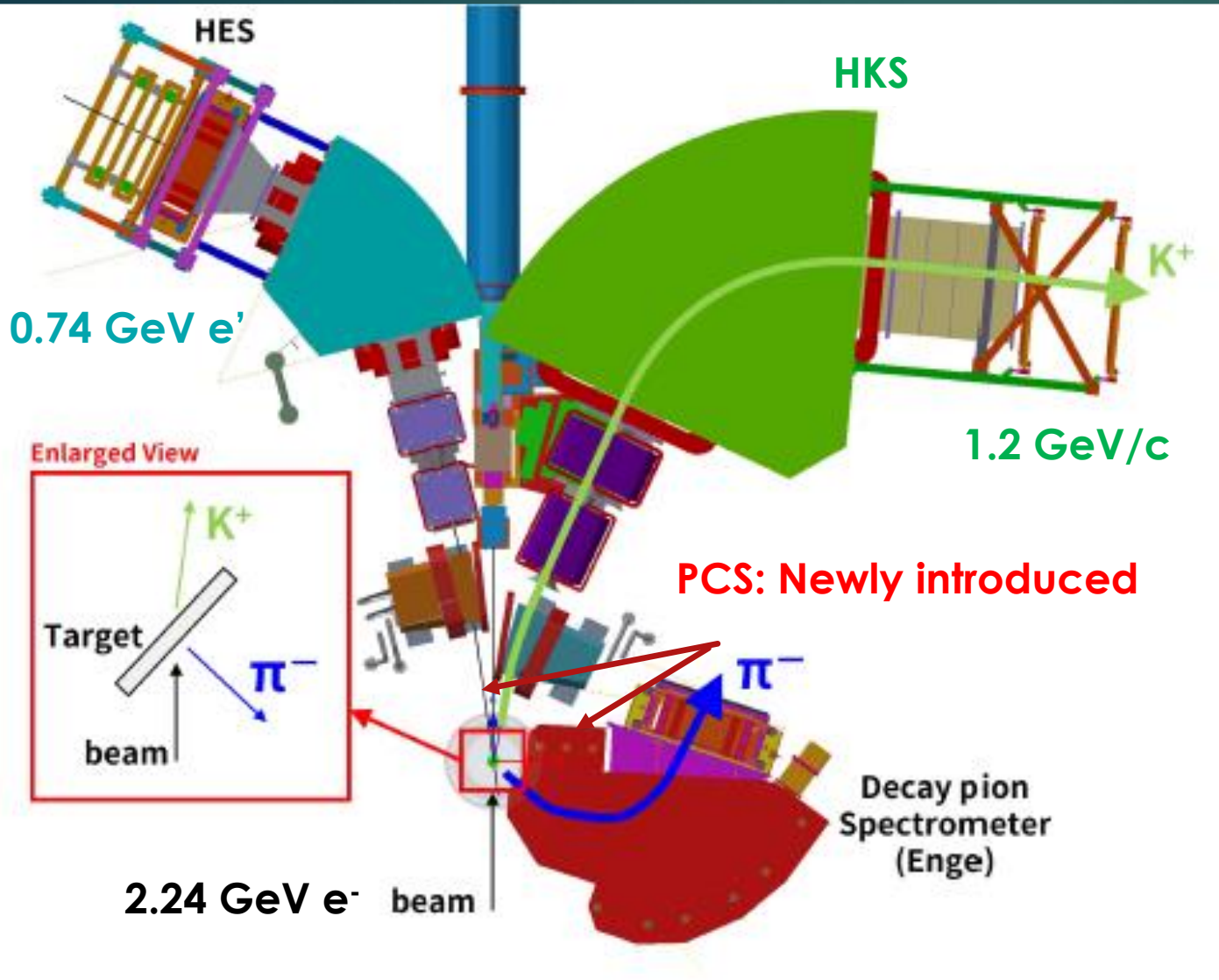
E12-24-003  ${}^{208}\text{Pb} (e, e'K) {}^{208}_{\Lambda}\text{Tl}$

E12-20-013A/E12-15-008A Decay  $\pi$  spectroscopy

E12-19-002 Cryo. Gas  ${}^{3,4}\text{He} (e, e'K) {}^{3,4}_{\Lambda}\text{H}$



# Experimental Setup



HKS, HES : Proven operational in E05-115

ENGE : Proven operational in E89-009, E01-011

## Newly introduced:

PCS

Target system with vacuum chamber

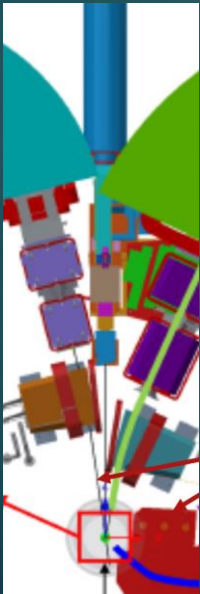
ENGE detector package

HKS Water Cherenkov (replacing old ones)

# Requirements for beam

Item		Value
Beam	Energy	2.24 GeV
	Energy stability	$3 \times 10^{-5}(\sigma)=70$ keV
	Energy spread	$3 \times 10^{-5}(\sigma)=70$ keV

Beam diagnose tools including SLI : presentation by Dave Gaskel

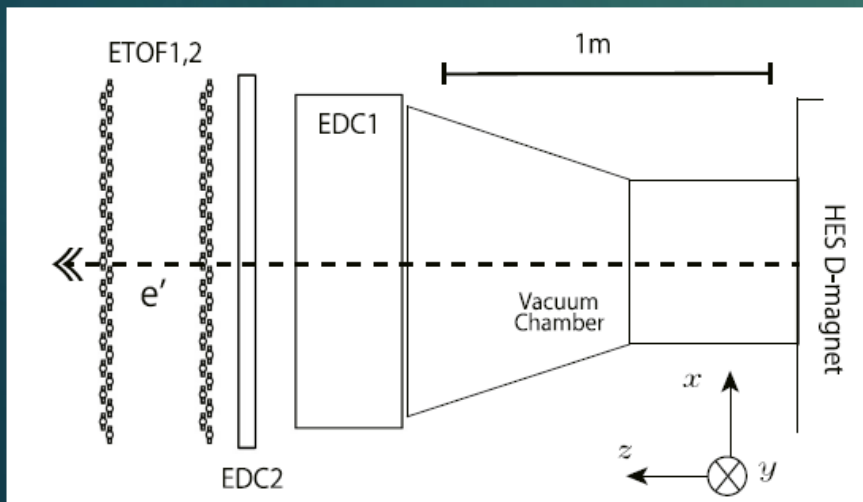


Safe unused beam transportation to the dump : by Steve Lassiter

# High resolution Electron Spectrometer (HES)

Configuration	Q-Q-D 50 deg bend
Central momentum	0.6 – 1.0 GeV/c
Dispersion	4.7 cm/%
Momentum acceptance	$\pm 17.5\%$
Momentum resolution	$2 \times 10^{-4}$ (FWHM)
Maximum magnetic field	1.65 T (normal conducting magnet)

Magnets  
by S. Lassiter



Honeycomb cell drift chamber for tracking (EDC1)  
Plastic scintillator hodoscopes (ETO1, 2)

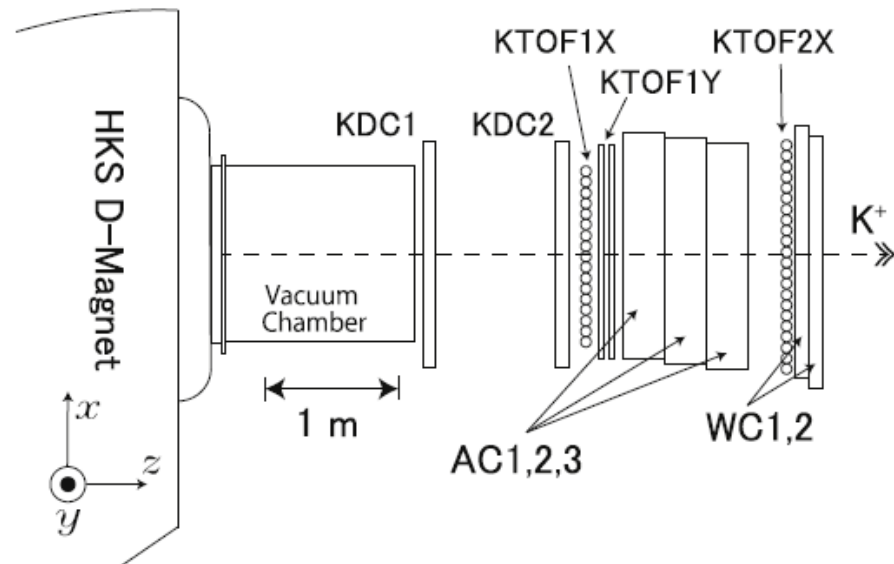
Detectors  
by T. Gogami

Achieved performance : T.Gogami et al., NIM **A900** (2018) 69.

# High resolution Kaon Spectrometer (HKS)

Configuration	Q-Q-D 70 deg bend
Central momentum	1.2 GeV/c
Dispersion	4.7 cm/%
Momentum acceptance	$\pm 12.5\%$
Momentum resolution	$2 \times 10^{-4}$ (FWHM)
Maximum magnetic field	1.53 T (normal conducting magnet)

Magnets  
by S. Lassiter



Drift chambers for tracking (HDC1,2)  
Plastic scintillator hodoscopes (KTOF1X, 1Y, 2X)  
Aerogel Cherenkov counters (AC1,2,3)  
Water Cherenkov counters (WC1,2) : to be renewed

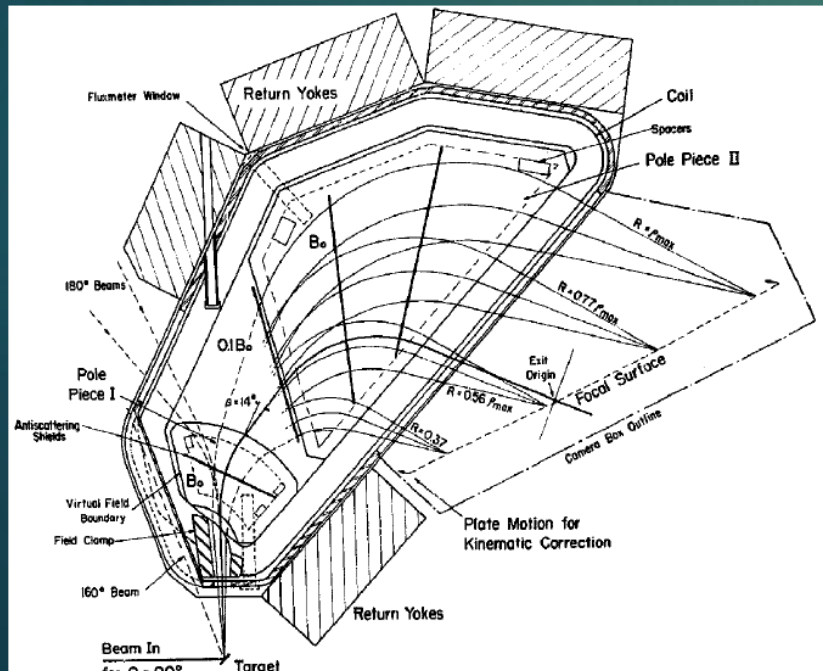
Detectors  
by T. Gogami

Achieved performance : T.Gogami et al., NIM **A900** (2018) 69.

# ENGE type split-pole spectrometer (ENGE)

Configuration	Split-pole Dipole
Central momentum	$< 0.4 \text{ GeV}/c$
Dispersion	$1.85 \text{ cm}/\%$
Momentum acceptance	$\pm 20 \%$
Momentum resolution	$4 \times 10^{-4} \text{ (FWHM)}$

Magnets  
by S. Lassiter



Scintillation fiber  
Plastic scintillator hodoscope  
Drift chamber

Detectors and detail of Decay  $\pi$  spectroscopy  
by S. Nagao

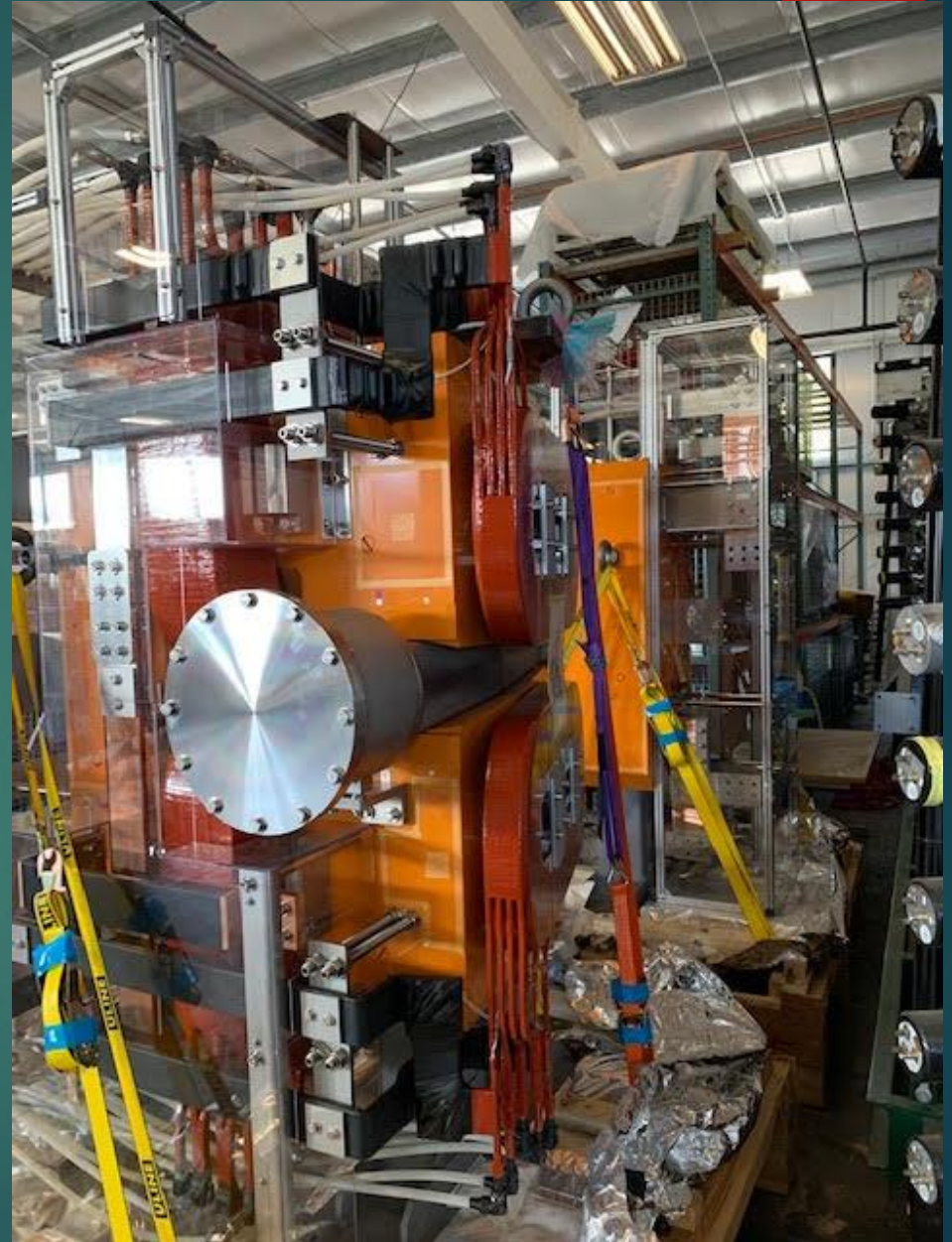
H.A. Enge, NIM **162** (1979) 161.

Newly introduced PCS  
Constructed in Japan and transported to JLab



Newly constructed PCS magnets  
(TOKIN, 2020.3)

To be explained by S. Nagao

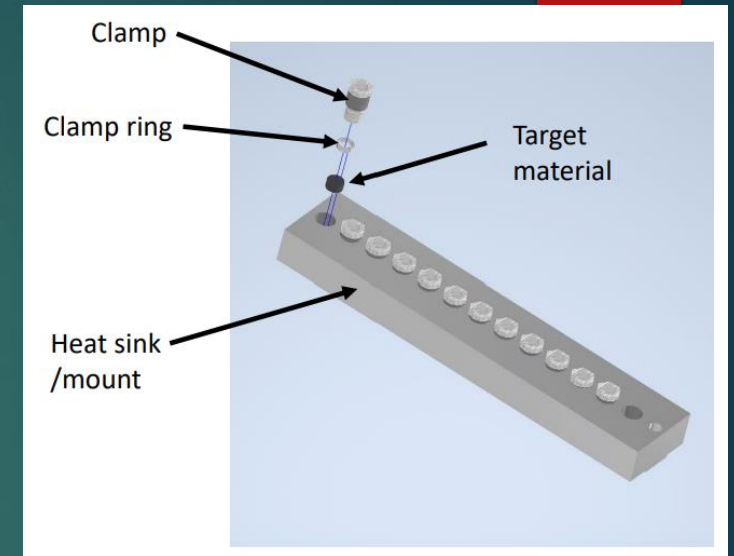


Delivered to JLab (2022.2 @ JLab)



# Target, beamtime list

Material	Thickness / (mg/cm <sup>2</sup> )	Length in radiation Length	Beam time /hours	Beam current / $\mu$ A	Remark
CH <sub>2</sub>	450	10.110-3	144	2	Energy calibration, Raster 2×2 mm <sup>2</sup> <b>Calibration</b>
<sup>6</sup> Li	100	1.4010-3	120	50	E12-24-004, Raster 2×2 mm <sup>2</sup>
<sup>9</sup> Be	100	1.5310-3	384	50	E12-24-004
<sup>11</sup> B	100	1.8710-3	72	50	E12-24-004, B <sub>4</sub> C
<sup>12</sup> C	150	2.3410-3	168	50	Energy calibration <b>Calibration</b>
<sup>12</sup> C hole	150	2.3410-3	-	10	Beam position check Raster 2×2 mm <sup>2</sup>
<sup>27</sup> Al	150	6.2410-3	672	50	E12-24-011
<sup>40</sup> Ca	150	9.3110-3	456	50	E12-15-008/E12-24-013
<sup>48</sup> Ca	150	7.7610-3	552	50	E12-15-008/E12-24-013
<sup>208</sup> Pb	150	23.510-3	1000	25	E12-20-013/E12-24-003 Raster 2×2 mm <sup>2</sup>

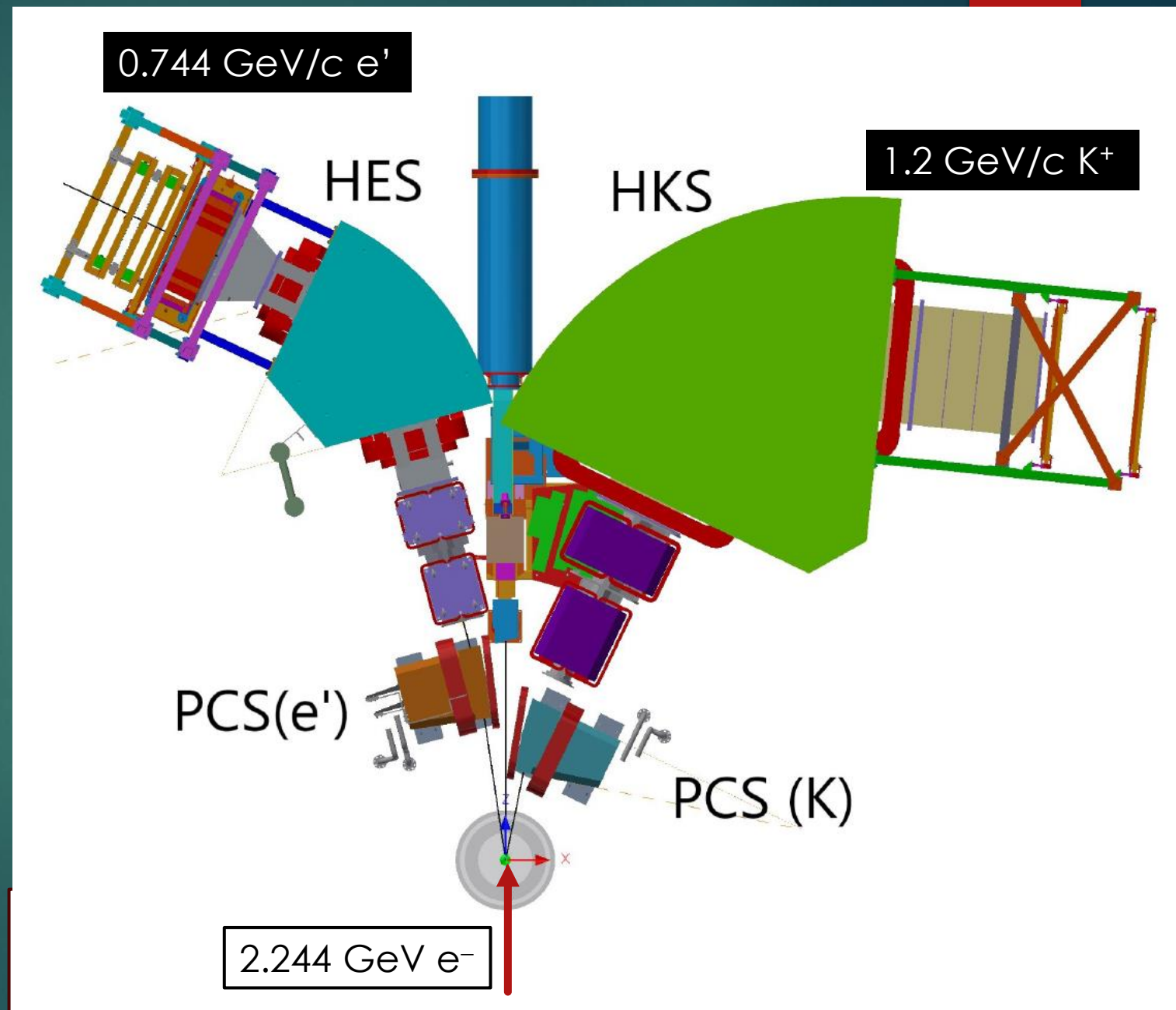
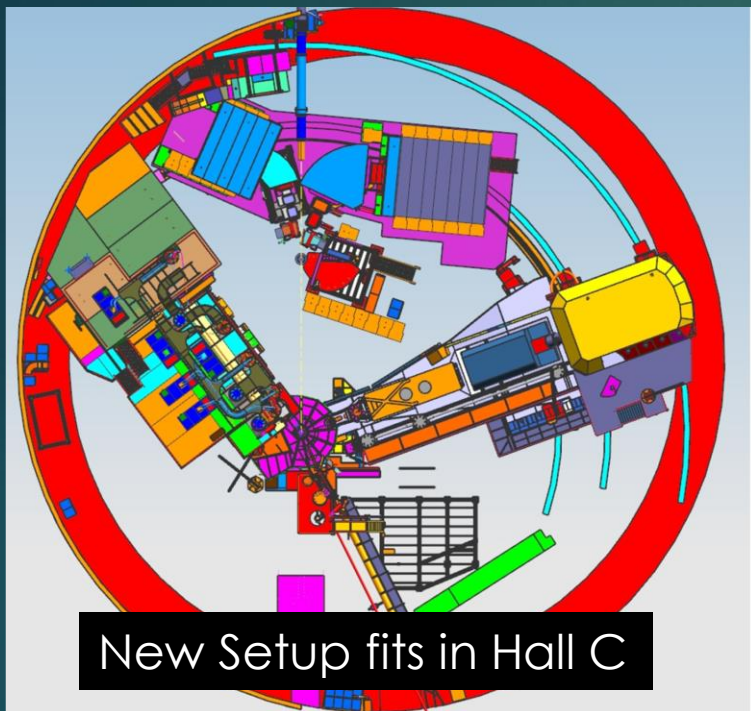


Target ladder concept

To be discussed by D. Meekins

Radiation budget will be given by P. Degtiarenko

# Setup in Hall-C



# Detector Status, Commission

Detector commission : out of Hall-C  
checking sources & cosmic rays

HDC1,2, HTOF, AC : used in E05-115

WC : **NEW** improved version of used one

EDC : used in E05-115

ETOF : used in E05-115

ENGE PSci.Fi. : **NEW** under design

PDC : Used in E05-115 (Spare of HDC)

PTOF : **NEW**

# Commissioning, Run plan

Energize test of HKS-HES D PSs before installation

After installation, before beamtime

Overall detector test with checking sources & cosmic ray

Dry run	DAQ test w/beam	CH2,C12,SS	Light HY (CSB)	CH2,C12,SS	Isospin (Ca40,48)	CH2,C12,SS	Triaxial (AL27)	CH2,C12,SS	Heavy (Pb208)
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