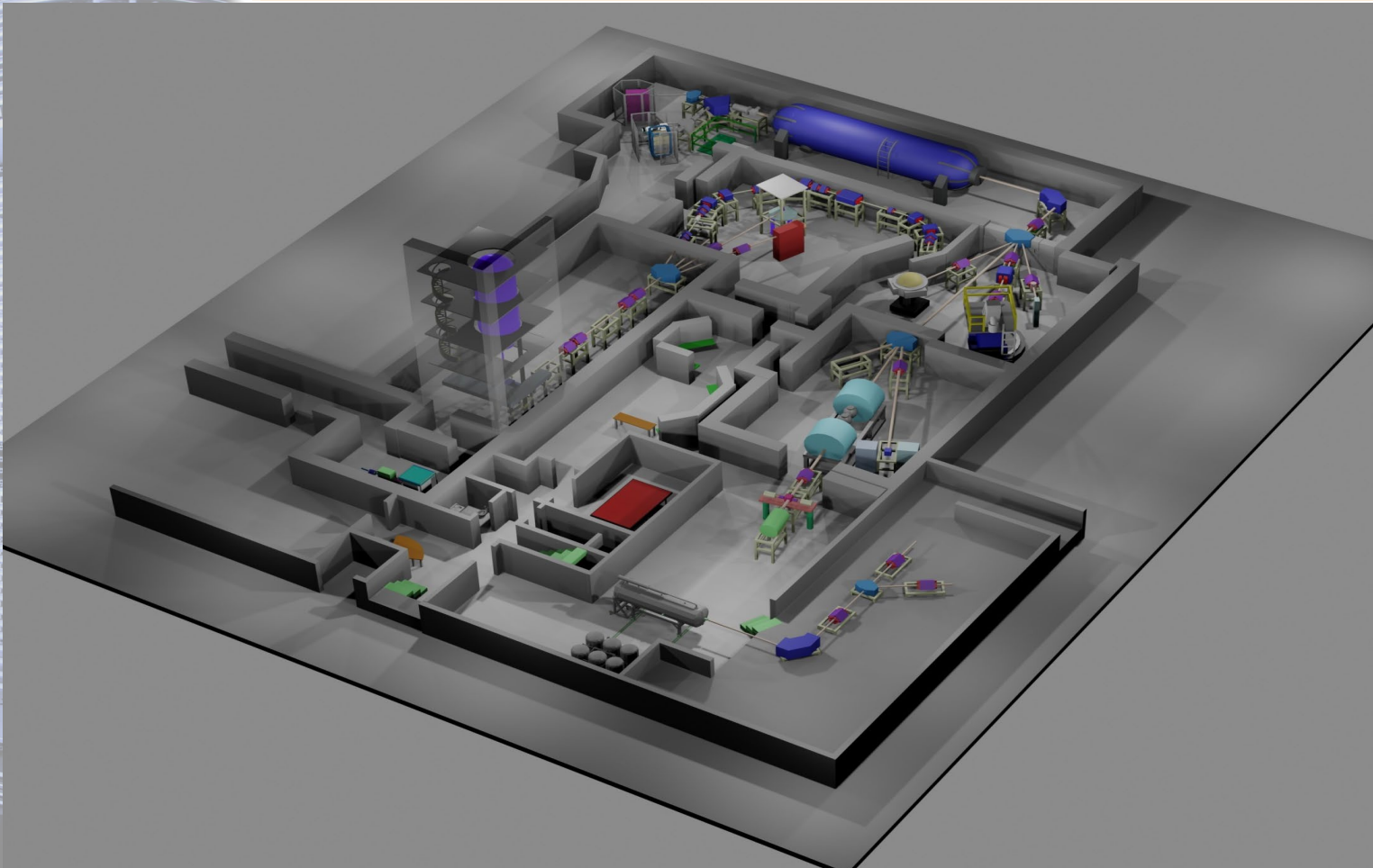
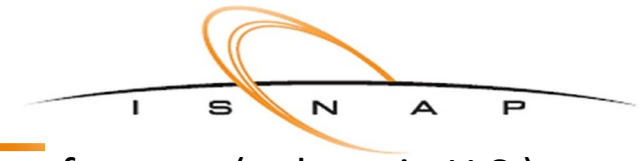


Instrumentation Plans at the Notre Dame Nuclear Science Laboratory – Dan Bardayan

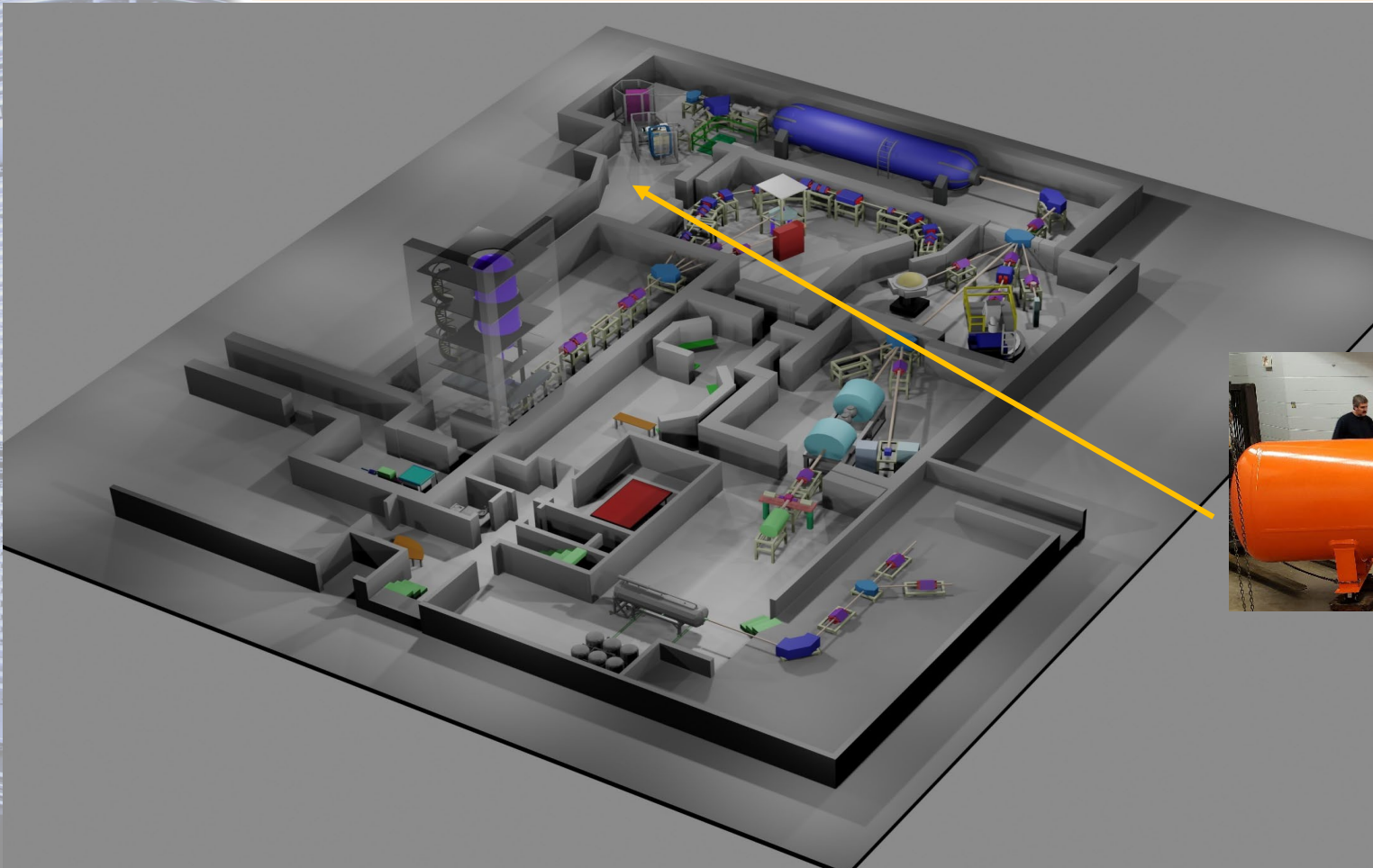


Some unique features (at least in U.S.):

- Operate 3 accelerators simultaneously.
- Measure capture in inverse kinematics with high intensity beams (St. George).
- Operate only underground nuclear physics lab.



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\$2.5M University investment in FN.
Transition to full SF₆ operations.

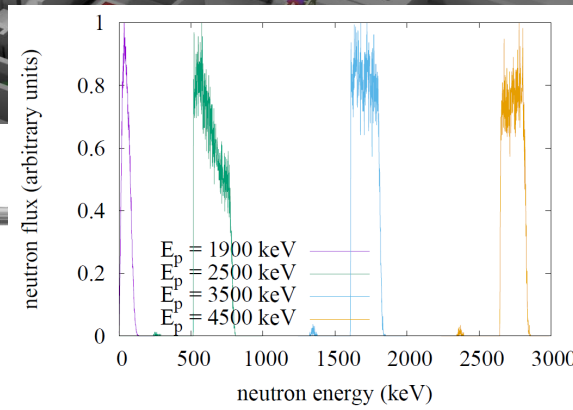
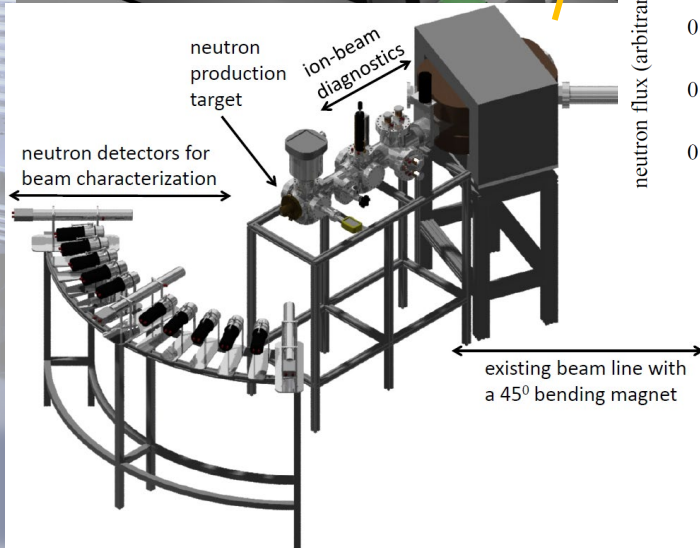
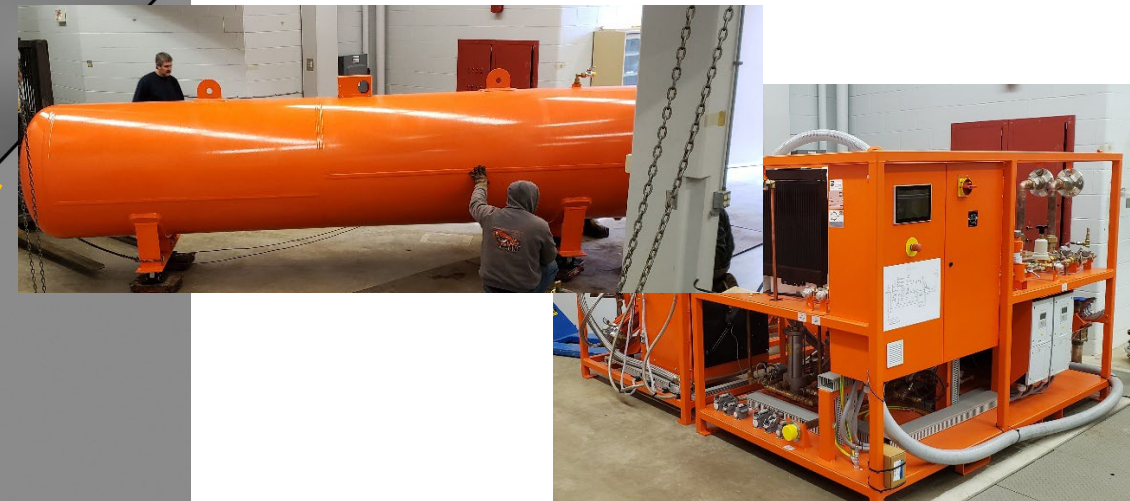
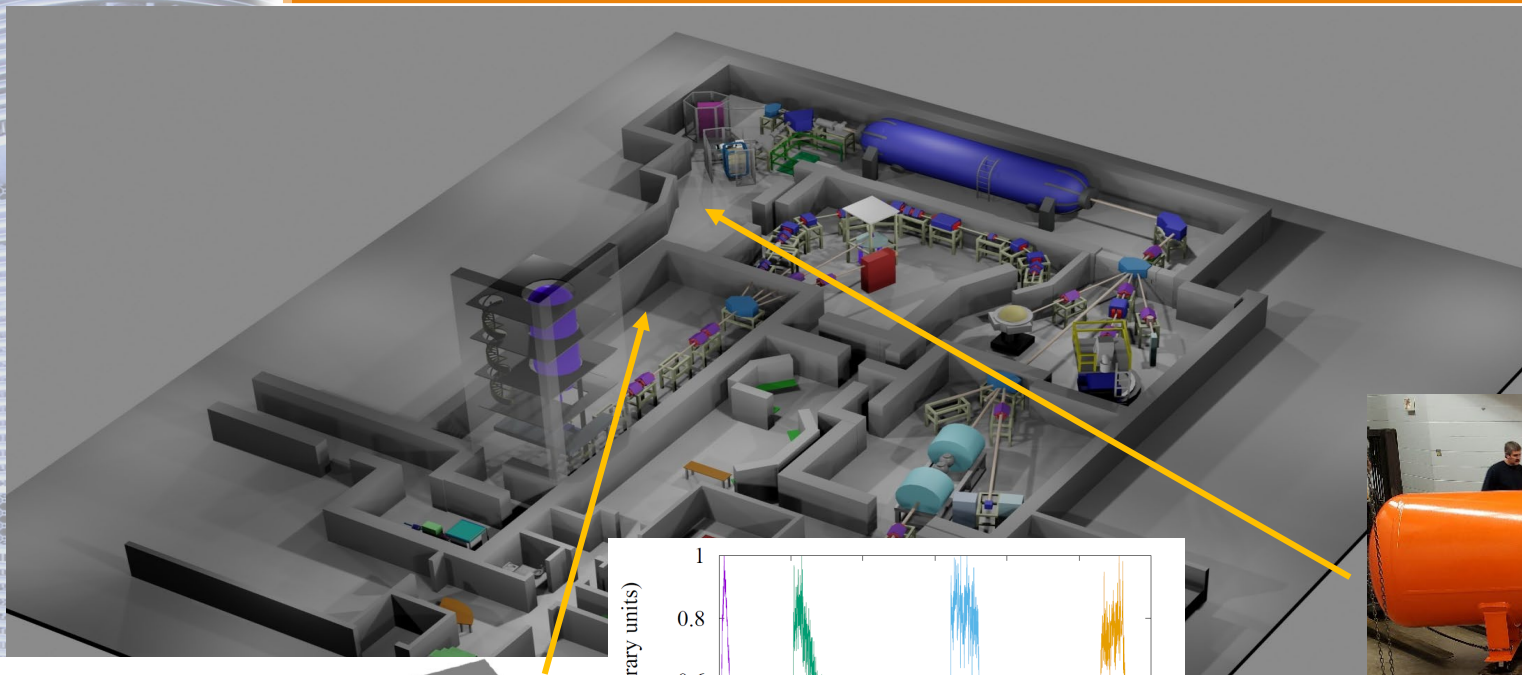


Instrumentation Plans at the Notre Dame Nuclear Science Laboratory – Dan Bardayan



Some unique features (at least in U.S.):

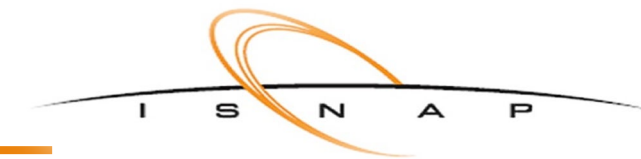
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Intense “monoenergetic” neutron source from (p,n) and (α ,n) reactions on various targets.

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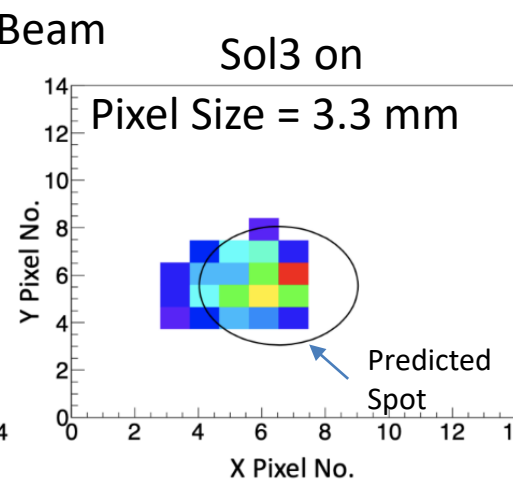
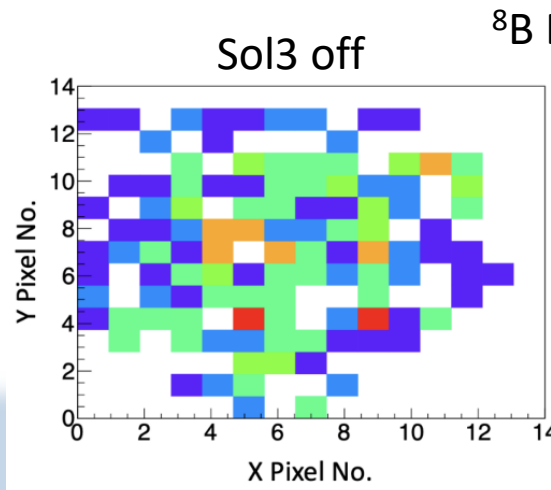
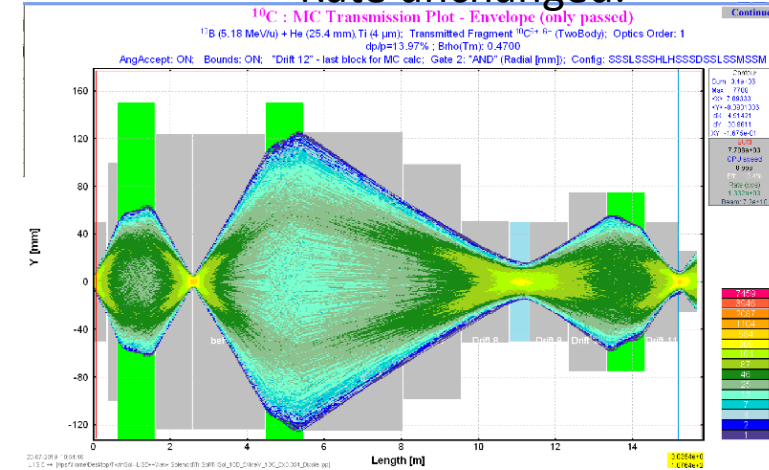
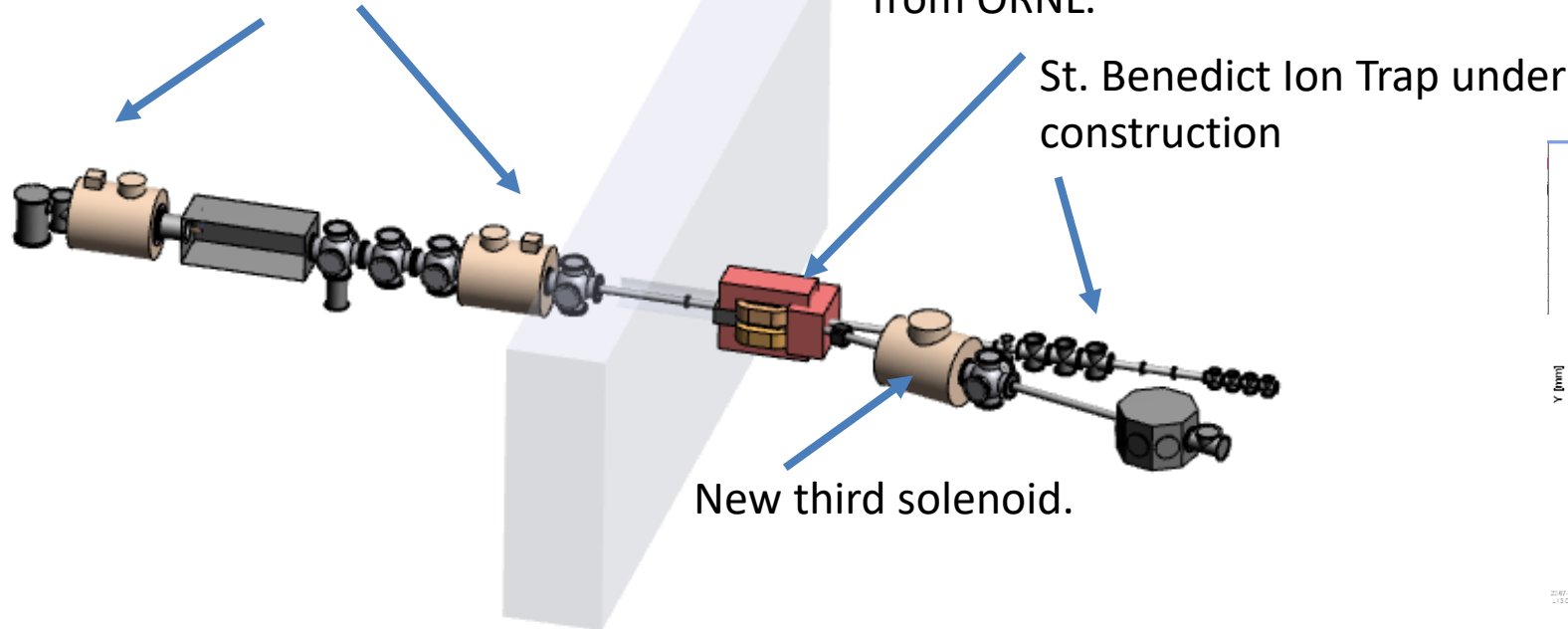
TwinSol becomes TriSol



Original TwinSol Solenoids

15° switching magnet transferred from ORNL.

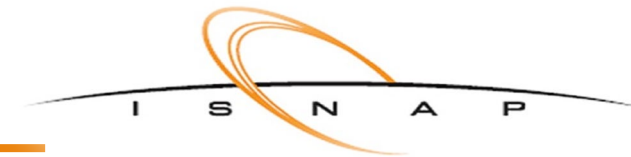
Beam Spot decreased to 8 mm (from 25 mm).
Rate unchanged.



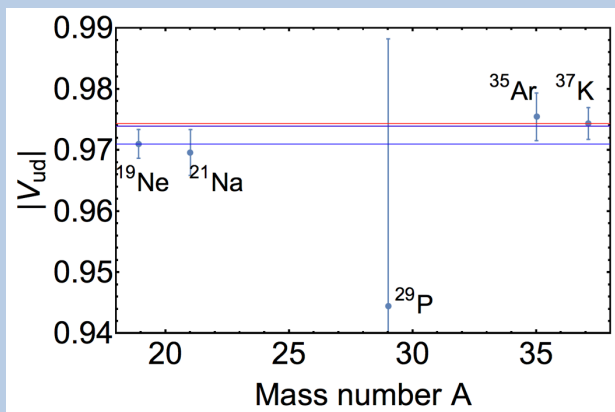
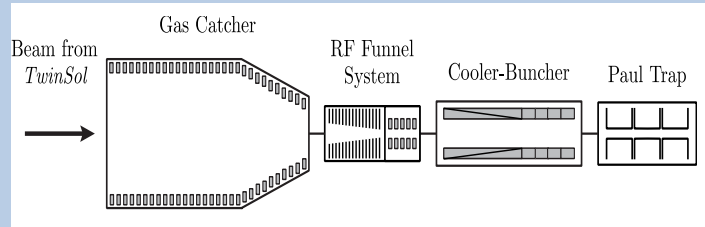
Beams of ^7Be , ^8B , ^{11}C , ^{14}O , ^{17}F demonstrated summer 2022.



New instruments for use with exotic beams



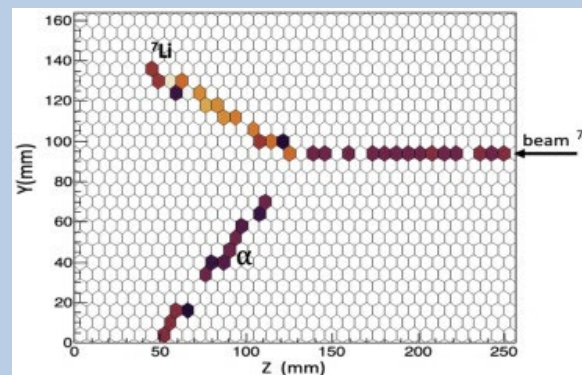
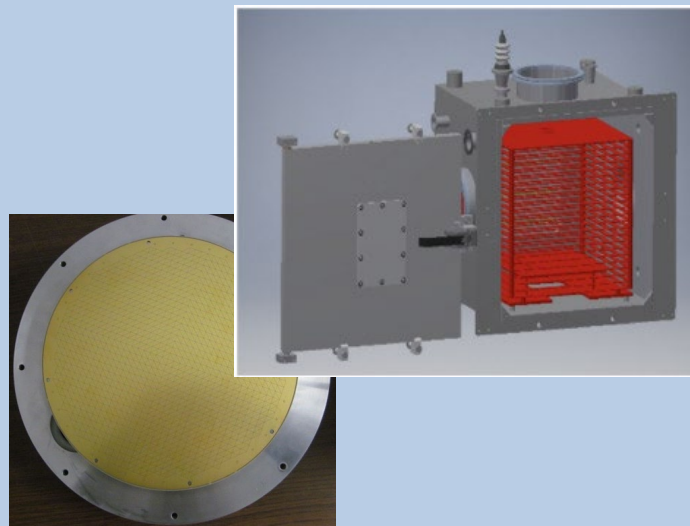
ST. BENEDICT



Measure the β - ν angular correlation parameter for superallowed mixed beta decay transitions between mirror nuclei

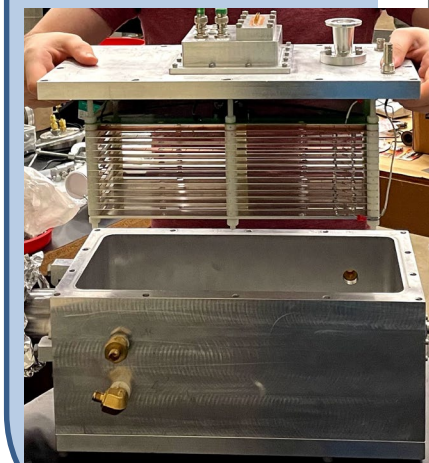
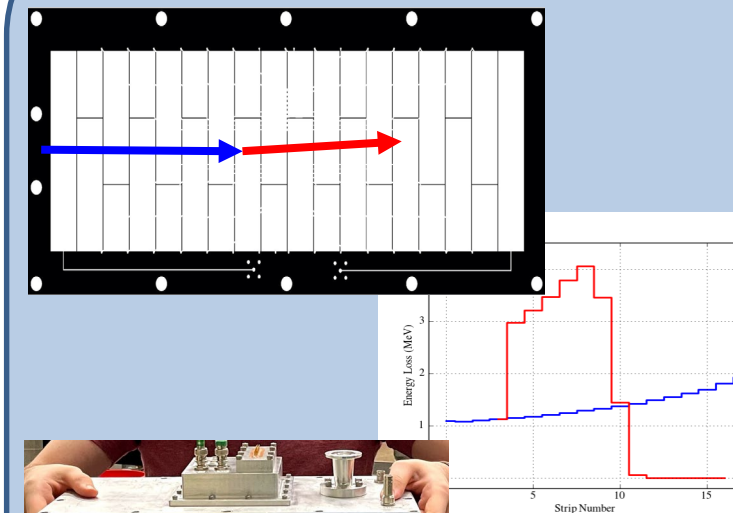
Valverde et al., Hyperfine Int. (2019)

ND-CUBE



Ahn et al., NIMA (2022)

ATHENA



(α ,p) and (α ,n) reaction on exotic beams for astrophysics

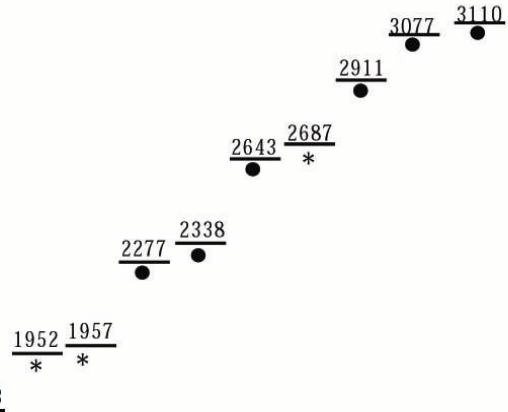
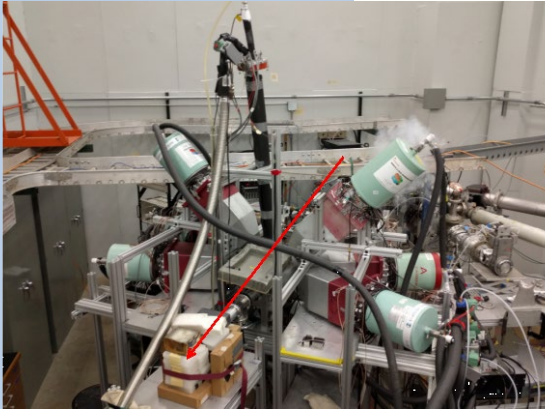
Blankstein et al., NIMA (accepted)



New spectrometers coming on-line



FIREBALL



FIREBALL

1743
1452
1577
1196

^{158}Gd : 13 0^+ states
Leshner et al., PRC (2002)

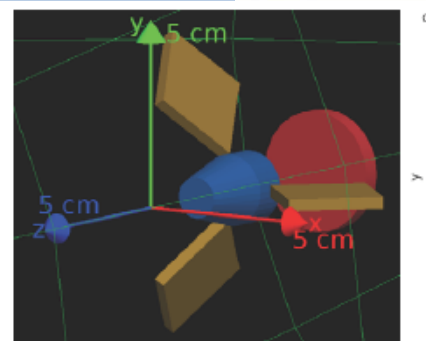
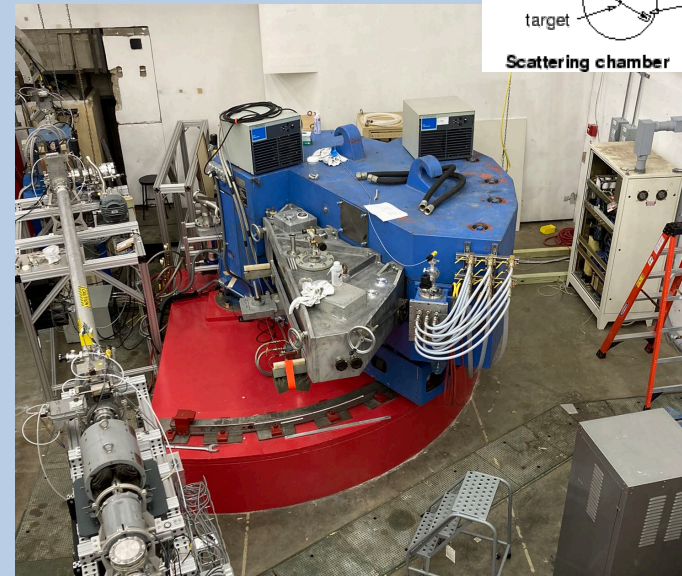
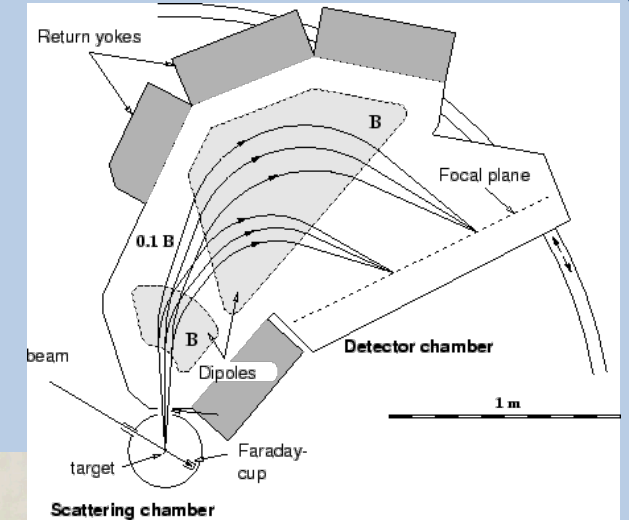


Figure 1: COMSOL/Geant4 simulation of one mini-orange filter with a Si(Li) detector.

Conversion electron spectrometry to probe the nature of 0^+ levels.

Notre Dame Enge Split Pole

(d,p) , $(^3\text{He},d)$,
 $(^3\text{He},t)$, $(^3\text{He},\alpha)$,
 $(^6\text{Li},d)$, $(^7\text{Li},t)$,
etc...



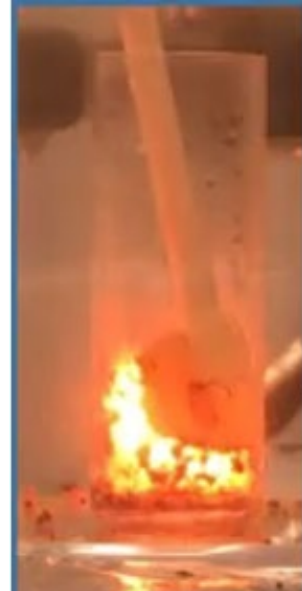
Commissioning
Spring/Summer
2023.

Target Making at NSL

Conventional methods



Solution combustion synthesis



Khachatur Manukyan (NSL)

