SECAR Project Update

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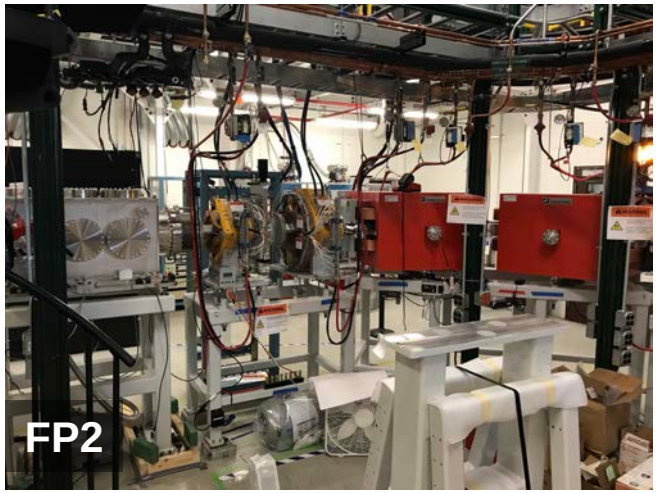
SECAR enables direct measurements of
astrophysical p- and α-capture reactions at NSCL/FRIB

SECAR
Separator for
Capture Reactions

SECAR Progresses on Schedule


First section through WF1


FP2


Final Focal Plane

- Installation complete except for
  - Second Wien filter (beam pipe available)
  - Last diagnostics elements
- Commissioning with beam up to FP2
- On track for 2021 project completion

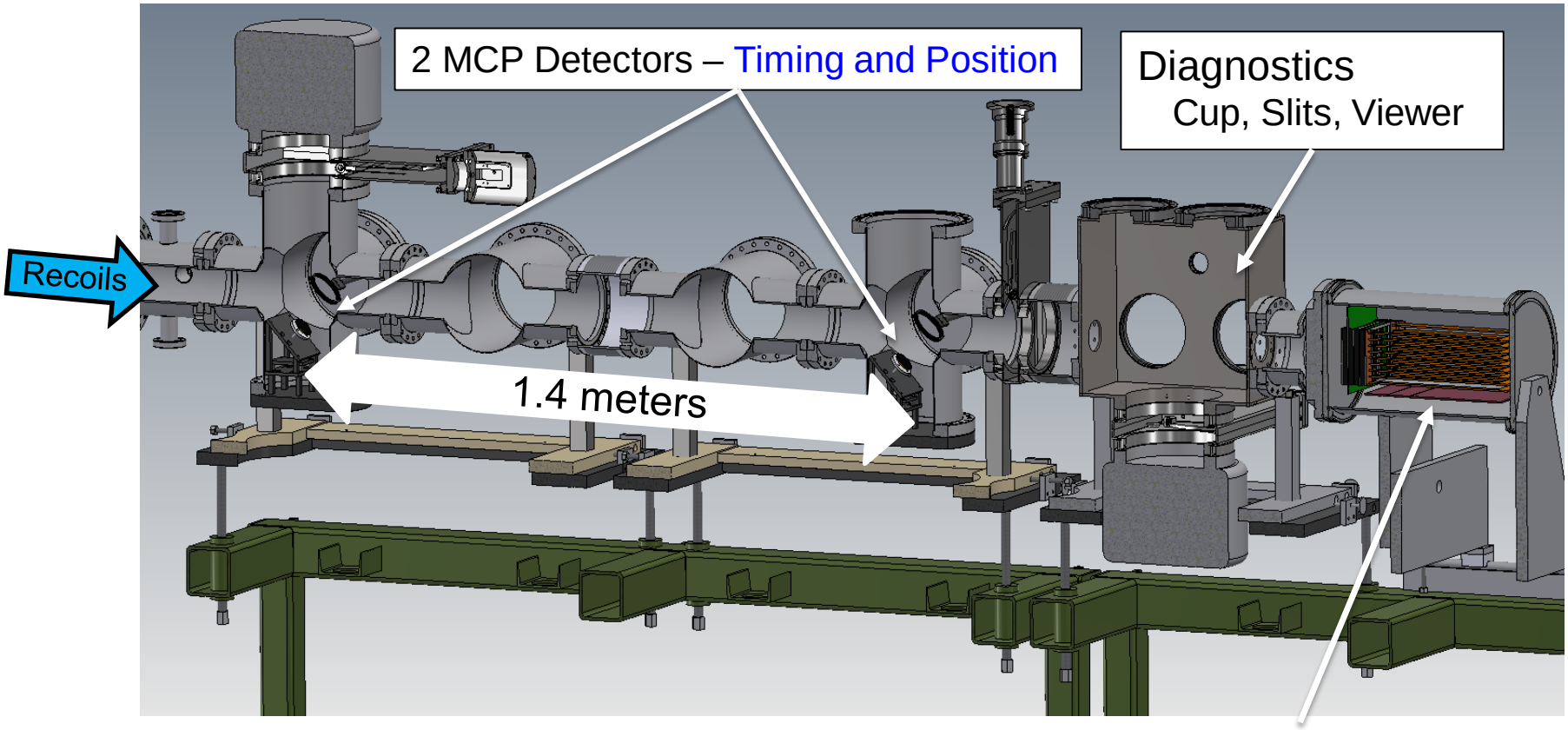
Proposal Preparation for SECAR [1]

- More information will be added to website: secar.space
- The system was designed for (p,γ) and (a,γ) measurements in inverse kinematics. An (α,n) reaction program is planned.
- We welcome other ideas or applications of SECAR
- SECAR is located in the ReA3 hall. Beams are limited to ReA3.

Proposal Preparation for SECAR [2]

- Technical data:
  - Windowless gas target: extended target chamber or jet (JENSA) available
    - » Extended target maximum thickness: ~10^{19} cm^{-2}
    - » Jet maximum thickness: 10^{19} cm^{-2}
  - BGO array for gamma detection at target position
    - » Efficiency 49% at 1.3 MeV (extended target)
  - SECAR nominal acceptance:
    - » Angular: +/- 25 mrad
    - » Energy: +/- 3.1%
    - » Rigidity Bρ: 0.14-0.8 Tm, Eρ: 1- 16 MV (for nominal optics ρ. Larger ρ optics can be used but will result in lower rejection)
    - » Only a single charge state can be accepted by the full system
  - Rejection: initial goal 10^{-13} for A<65
    - » Sufficient for (p,γ) measurements with <10^{7} pps beam
    - » Performance expected to be better for lighter mass beams, worse for heavier mass beams but experiments still possible
    - » Performance better for reactions with larger beam-recoil mass differences
  - Focal plane: 2 MCP position sensitive TOF detectors, IC, Si-detector

Flexible Focal Plane Setup



Time-of-flight resolution < 1ns

ΔE resolution $\sim 20\%/\sqrt{E_{dep}}$

E resolution $< 1\%$ using Si stopping

Stopping Detector – Relative Energy Loss, Position and Total Energy

SECAR is an Open Collaboration

- SECAR will be an FRIB supported device open to all FRIB users
- SECAR is an open collaboration. Join by contacting Hendrik Schatz (Schatz@msu.edu) or Michael Smith (smithms@ornl.gov).
- If you wish to carry out an experiment in collaboration with members of the SECAR collaboration:
  - You should join the SECAR collaboration
    - » The SECAR core group will be invited to join all proposals
  - We will coordinate proposals
    - » To avoid overlap
    - » To coordinate required technical developments and beam development requests
    - » To develop data sharing plans
  - We will support each other with proposal planning and preparation
- There are opportunities to engage
  - Join commissioning – commissioning experiments will resume as soon as NSCL reopens. Activities will continue through the transition to FRIB.
  - Opportunities to lead technical developments are available

Next Steps for the Collaboration

- Complete SECAR and transition to science program
- We will fully implement our collaboration agreement and elect an executive council (see secar.space for details)
- We will have follow-up workshops to collect information on planned proposals in the collaboration, and on future ideas.
  - Join the SECAR collaboration if you are interested in participating
  - Participate if you plan early experiments

SECAR is an Open Collaboration
Interested in Joining? Talk to me or Michael Smith

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