

Recoil Separators: St. George @ND and SECAR @FRIB



- St. George to study (α, γ) reactions induced by high intensity stable beam
 - Studies of helium burning reactions and sources of neutrons for the s-process in AGB stars
 - Plan for low energy studies of $^{14}\text{N}(\alpha, \gamma)^{18}\text{F}$, $^{15}\text{N}(\alpha, \gamma)^{19}\text{F}$, $^{20}\text{Ne}(\alpha, \gamma)^{24}\text{Mg}$ and $^{22}\text{Ne}(\alpha, \gamma)^{26}\text{Mg}$
 - Angular and Energy Acceptance completed – currently limited to $\pm 26\text{mrad}$ @ $\Delta E/E = \pm 8\%$
 - Known resonances studies in $^{14}\text{N}(\alpha, \gamma)^{18}\text{F}$ and $^{20}\text{Ne}(\alpha, \gamma)^{24}\text{Mg}$ confirm experimental approach and better than 10^{12} rejection by the separator only + $\sim 10^3$ by tof vs E techniques
 - Identification of beam contamination with recoil like ions at ~ 1 contaminant/ 10^{13} beam ions
 - Beam line Wien filter (from Michael Paul via Munich) under installation \rightarrow reduce to $\lesssim 1/10^{18}$ beam ions
- SECAR to study (p, γ) and (α, γ) reactions induced by reaccelerated unstable ions
 - Quiescent and explosive nucleosynthesis measurements
 - First PAC in May 2021 (submission deadline Feb. 2021)
 - Potential of stable beam when FRIB runs fast beams experiments
 - Construction to be finalized March 2021 with the installation of the second Wien filter
 - Early commissioning provided dipoles calibration, machine learning tuning,...
 - ~ 1500 hours of approved early science and commissioning
 - Simultaneous study of $^{20}\text{Ne}(p, \gamma)^{21}\text{Na}$ and $^{20}\text{Ne}(p, \alpha)^{17}\text{F}$
 - Measurement of (a, n) reaction for the alpha- or weak r-process



- Current SECAR scientific collaboration: 55 members
- Collaboration agreement is being implemented
- <http://secar.space/>



Separator for Capture Reactions