

Scoping Study for Reactions on Unstable Fission Products

Workshop for Applied Nuclear Data Activities (WANDA 2024)

Andrew Ratkiewicz for the Scoping Study Team



We are producing a scoping study on measuring and modeling cross sections on radioactive fission products

- We will identify:
 - Data needs for non-proliferation applications.
 - Current approaches for measuring and modeling cross sections on these exotic nuclei.
 - We will explore the relative strengths and weaknesses of the available approaches.
 - We will identify opportunities for investments in the development of techniques or equipment.
 - Opportunities offered by accelerator facilities in the United States
 - FRIB, nuCARIBU will create many beams of interest.
 - Powerful new detector systems.
 - We will identify key detection system capabilities required for these measurements, and the facility investments required to realize them.
 - The state of the art in the theory of nuclear reaction reactions on exotic systems.
 - Nuclear structure of exotic systems is important, but challenge standard descriptions developed near stability.
 - We will discuss current approaches and the limits of their applicability.
 - We will identify areas where investments will enable the challenges posed by exotic nuclei to be met.

We will deliver a report that identifies these needs and opportunities by 9/15/2024

Deliverable and Milestones:

- **Milestone:** Workshop Completion (December 15)
 - Expected outcomes:
 - Collections of slides; discussion notes and summaries.
- **Milestone:** Topic areas researched (March 15)
 - Expected outcomes:
 - Writers have completed any additional research required in their assigned topic areas.
 - Lead writers have very early draft (skeleton) of topic area section.
 - Lead writers have shared topic area section skeleton with writing team. This will promote the construction of a cohesive narrative.
- **Milestone:** Draft of Scoping Study (June 15)
 - Expected outcomes:
 - Lead writers incorporate the notes received from skeleton review into their sections, produce mature drafts (May 30).
 - Ratkiewicz combines the topic area sections into complete study, provides interstitial material as required.
- **Deliverable:** Scoping Study submitted (9/15)
 - Expected outcomes:
 - Ratkiewicz provides draft of scoping study to collaboration by June 15.
 - Collaboration provides feedback by July 15.
 - Ratkiewicz incorporates feedback and produces final Scoping Study for submission to DNN by 9/15.



Four takeaways from the Workshop:

- Direct measurements will not be possible in the near term. Indirect constraints are required.
 - A variety of techniques exist. They should be benchmarked against each other and against data.
- Predictive theories for a variety of conditions are required.
 - Exhaustive measurement campaigns are not feasible. Instead, measurements should be designed to constrain models.
 - Theories should make testable predictions, and then experiments should be fielded to test them.
 - Close cooperation between theory and experiment.
- Phenomenological models constrained near stability are likely to fail away from it.
 - Phenomenological models are still valuable.
 - We should work towards building microscopic models that are predictive because we understand the physics at play.
- Understanding the physics at play requires **sustained cooperation** between theory and experiment, and **sustained support** from sponsors and a range of facilities.
 - Theories need to be tested, so we will need beam time at facilities like ATLAS, FRIB, Ohio State, FSU, Notre Dame, TAMU, etc.

We welcome your feedback!

- Contact the project team:
 - ratkiewicz1@llnl.gov
- Unrelated plug: please attend the Isotopes and Applications Session at the Low Energy Community Meeting (August 7th-9th Knoxville TN).



QR code linking to LECM
registration page

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