Neutron Cross-Sections for Medical Radionuclide Production

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Supporting Investigators: Andrew Voyles

Abstract

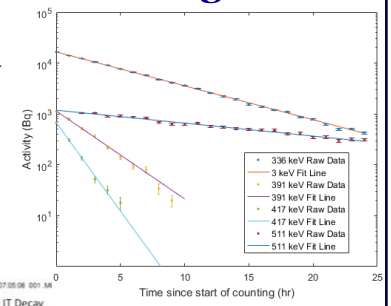
A series of experiments are being conducted at UC Berkeley to measure low-energy neutron-induced production cross sections for a range of emerging medical radioisotopes. One potential method for producing these isotopes is the use of the (n,p) reaction at compact D-D neutron generators. However, these cross sections currently have significant uncertainties. Direct neutron activation, using a 2.45-MeV D-D neutron generator, allows for more precise cross section measurements than time-of-flight methods, and potentially offers a proliferation-resistant pathway for radioisotope production.

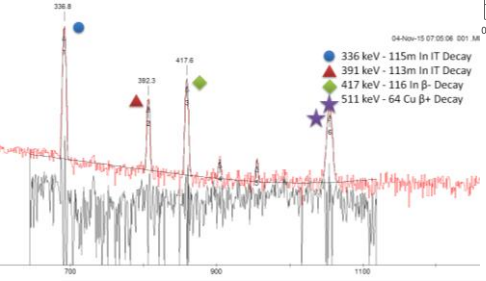
Goals, Objectives, and Deliverables

- **Goal**: To improve existing nuclear data capabilities by expanding cross section libraries for neutron-induced production reactions.
- **Objective**: Measure production cross sections for emerging medical isotopes and radiochemical tracers, via neutron activation. Decay spectroscopy will provide reaction cross sections with lower uncertainty than time-of-flight measurements.
- **Deliverable**: Improved low-energy production cross sections for neutron-induced reactions. Cross section measurements improve the fidelity of reaction modeling codes, used for estimating nuclear data when empirical data is unavailable.

Results/Technical Challenges

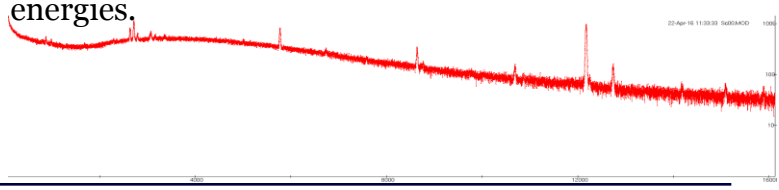
(n,p) production cross sections have successfully been measured to within 7% uncertainty for ^{64}Cu and ^{47}Sc.





Planned Accomplishments

- Continue measurements of neutron-induced production cross sections for emerging medical radioisotopes.
- Expand production cross section measurements to charged-particle induced reactions.
- Development of an intense, variable quasi-monoenergetic neutron source capability, to expand cross section measurements to higher energies.



Research Team

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Notes