SPIDER: Independent Fission Product Yields from 0.5-20 MeV

Jack Winkelbauer
LANL P3 Low Energy Nuclear Physics

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2E-2V FPY’s with SPIDER

- 2E-2v: Mass $\propto (E) \times (TOF)^2$
- Goal $<1$ AMU mass resolution, fast neutrons, well-understood uncertainty/covariance
- Challenges: resolution, calibration, scalability
SPIDER - Calibration Issues

- Unknown calibration, energy loss, and PHD
- Calibration depends on A,Z,E
- Calibration at external facility?
- Calibration with 252Cf?

\[ KE_1 = \frac{1}{2} A \frac{d^2}{dt^2} - \Delta E_{mc\psi} - \Delta E_{\text{window}} - PHD(E, A, Z) \]
SPIDER - Calibration Issues

- Gamma-ray tagging with hpGe
- Potentially calibration and resolution
SPIDER - Calibration Issues

- Unknown calibration, energy loss, and PHD
- Gamma-ray tagging with hpGe
- Resolution with Si DSSD ~1.4 FWHM
SPIDER - Calibration and Resolution(!)
SPIDER - Progress

- Calibration informs systematic error in FPY’s
- Resolution informs covariance
- Gamma spectra with calibrated mass, 252Cf(sf)
SPIDER - Progress at Lujan Center
Future - MegaSPIDER

- Scalability: Need 16 arms
- IFPY’s up to 20 MeV at WNR
- Measurement per beam year
- Analyzing IC vs. Si DSSD design choice
SPIDER People

- Current SPIDER team: J. Winkelbauer (PI), S. Mosby (PL), P. Gastis (PD), C. Prokop (S), S. Kuvin (S)