

# Actinide photonuclear evaluations at LLNL

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# Actinide photonuclear evaluations at LLNL

## Current evaluation deficiencies:

- Last ENDF evaluation was in ENDF/B-VII.0 (to the best of my knowledge)
  - Granted, this is not a deficiency in and of itself
- Complete absence of covariances in the photon sub-library.

## Why is an update needed?

- New data now exists on photofission ratios, prompt nubar, photo-single neutron
- Big Beautiful Evaluations: IAEA/JAEA have revisited actinide photonuclear reactions

## Time frame:

- What does a test look like?
- Adopted an iterative approach. Currently implementing 1<sup>st</sup> order GLS approach.
- Ongoing, first results already available in GNDS form.
- Further experimental data may/will become available (J. Silano/A. Ramirez/A. Tonchev)
- Will continue updating the experimental covariance matrices (especially for LLNL/Saclay data)
- Will implement model averaging theoretical approach

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## Evaluation approach:

- GLS over  $^{235}\text{U}/^{238}\text{U}/^{239}\text{Pu}$  data simultaneously.
  - Include photofission ratios
  - Include photo-absorption data
  - Include neutron production cross sections
  - Allow for the exclusion of experimentally “sorted” data
  - Include nubars

## Main results:

- Significant changes in  $^{239}\text{Pu}$  seem to be suggested by the ratio data
  - Significant increase in photofission cross section
  - Reduction of photoneutron cross sections
  - Visible change in nubar (to compensate for photofission)  
but still comparable to  $n+^{238}\text{Pu}$
- Smaller changes in uranium evaluation
- Differences are sensitive to datasets selected
  - Need a better assessment of experimental covariances
  - Need more data (really).  $^{239}\text{Pu}(\gamma,1n)$  would be very valuable, especially above 10 MeV.

