Los Alamos NATIONAL LABORATORY

# 5-10 year priorities for nuclear data covariances and uncertainty quantification as defined by the Nuclear Data Uncertainty Quantification Meeting

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# Nuclear Data Uncertainty Quantification Working Meeting (NDUQM) defined 5-10 year priorities for ND cov. & UQ.

- Took place Oct. 11-13, 2022.
- Asked for by DOE Office of Science to advise on needs for future work.
- Goal:
  - To draft a whitepaper on prioritized nuclear data covariance and uncertainty quantification needs impacting users,
  - Needs must be actionable (i.e., high-level plan must be given to address them),
  - Needs must be feasible to tackle (high-level idea of funding must be provide).
- Advisory committee: 30 participants spanning
  - Producers: experiment, modeling, evaluation, processing, validations.
  - to users: astrophysics, criticality safety, isotope production, neutron dosimetry, nuclear medicine, nuclear security, NRC, reactor design, safeguards, space applications, etc.
  - On first day, 10 DOE program managers observed.

# Cross-cutting and prioritized high-level priorities

1. Towards complete, medium-fidelity covariances:
    1. Neutron-induced cross-sections up to 60 MeV,
    2. Angular distributions,
    3. Charged-particle induced reactions up to 250 MeV.
2. Quality assurance of covariances via standardized V&V and proper documentation,
3. Towards a more complete and easier accessible EXFOR and expert judgment database
    1. Create easily accessible EXFOR app and store data as used by evaluators,
    2. Maintain and update templates,
    3. Develop tools to assess unrecognized systematic uncertainties,
4. Expand training on covariances, existing UQ methods and tools,
5. Open-source adjustment tools for general user community.

# Other priorities

- Open-source tools to compute sensitivities for various integral responses,
  - Code comparison and review of existing tools,
  - RR, spectra, sub-crits,
  - Fixed source, reactivity coefficients,
  - Make recommendations how other user communities can use tools,
- New evaluations of covariances:
  - TSL,
  - FPY,
  - Decay constants,
  - Branching ratios,
  - Stopping power,
  - Delayed neutrons,
- Sampling tools for applications that are in non-linear regime,
- Identify historic integral experiments for re-evaluations.