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

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

- Asked for by DOE Office of Science to advise on needs for future work.
- Goal:
  - To draft a whitepaper on prioritized ND cov. and UQ needs impacting users,
  - Needs must be actionable and feasible to tackle (i.e., high-level approach and level of needed funding will be provided.
- Advisory committee: 30 participants spanning
  - Producers: experiment, modeling, evaluation, processing, validation,
  - 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

A. 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.

B. Quality assurance of covariances via standardized V&V and proper documentation.

Neudecker et al., EPJ-N 6, 19 (2020).
Cross-cutting and prioritized high-level priorities

C. 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,

D. Expand training on covariances, existing UQ methods and tools,

E. Open-source adjustment tools for general user community.

Uncertainties in EXFOR

From B. Pritychenko

From R. Casperson, WANDA 2022
Other high priorities for sub-sets of users

- 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,

- Sampling tools for applications that are in non-linear regime,
- Identify historic integral experiments for re-evaluations.
- New evaluations of covariances: TSL, FPY, Decay constants, Branching ratios, Stopping power, Delayed neutrons.

From V. Sobes

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