

## Discussion Points for Kick-off Meeting of SG44

- Differences with respect to SG2:
  - More advanced S/U analysis capability today. Monte Carlo sensitivity calculations have brought S/U analysis mainstream.
  - Development of nuclear data adjustment as feedback to nuclear data evaluation in a systematic manner (continuous-energy nuclear data adjustment).
  - Addressing of cross correlations.
  - Availability of low-fidelity covariance data.
- Differences with respect to SG20:
  - Consider the correlation between RRR and URR, probably through common model parameter uncertainties like scattering radius.
- Differences with SG24
  - Cross-correlations in energy.

With the above differences of SG44 with respect to previous WPEC sub-groups, I view SG44 with having the following unique aspects:

1. Opportunity to redefine the covariance format working with GND. Of special interest is to provide covariance data in an SVD form.
2. Consider cross-correlations for energy, reaction and isotopes. Care has to be devoted in order to avoid generating a full matrix that can become untreatable.
3. Can we define a nuclear data covariance validation procedure in a “loose” sense of validation? Can we construct a frame work that will be able to identify if evaluated nuclear data uncertainty proposed for inclusion in a nuclear data library is “way too small” or “way too large?” Can we work with SG45 to keep track of the propagated nuclear data uncertainty for criticality safety benchmarks to allow the changes to be tracked easily?
4. Use of “a-posteriori” covariance and cross correlations data as a result of an adjustment.

### **Best Practices Document**

- The central deliverable of this Subgroup.
  - Address all four Areas listed below.
  - Promote/advertise the usage of the published document/recommendations. How can we best promote the future use/application of the recommendations of this international sub-group?
  - Stress that covariances should be generated with mean values not as an after-thought.
1. Address / Review any open questions or questions worth reconsidering from previous sub-groups in light of latest computational advancements and experimental methods.
  2. Explore previously unexplored questions.

## Area 1: Experimental Sources of Uncertainty

- Interpretation and treatment of experimental sources of uncertainty.
- List of often over-looked sources of experimental uncertainties.
- Identify/improve documentation methods for experimental uncertainties. *Joint effort with Area 4.*
- How do we know if reported experimental uncertainties are too small?
- Provide guidance on how to eliminate or correct bad data sets. Look at other scientific fields and statistical methods.
- Consider statistical distributions other than normal/log-normal. *Joint effort with Area 4.*
- Systematic model uncertainties.
- Consider uncertainty on uncertainty.
- Provide detailed examples:
  1. Autonomous/automatic methods used on non-discrepant data.
  2. Handling of discrepant data sets.
- The effect of data normalization in RRR evaluation? Can it be directly absorbed in resonance parameters? Should it? Should resonance parameter uncertainties make sense or should only cross section uncertainty make sense? Can we have instances when both are not possible?
- Use model defects idea to account for data normalization uncertainty?

## Area 2: Cross-Correlation

1. Energy regions (RRR/URR, RRR/Continuum)
  2. Reactions, constricted by Unitarity
  3. Other types of data, not just cross sections
  4. Cross-Isotope
- Consider the effect of neglecting cross correlations. Can we define an upper limit of the consequences. *Joint effort with Area 3.*
  - Can we fill in cross-correlations using integral feedback mechanisms? Energy, reaction, isotope? *Joint effort with Area 3.*
  - Can we dedicate space for storing evaluation/integral experiments correlations?

- How can integral feedback be useful in defining nuclear data covariance for general purpose libraries without tying up all isotopes together? Need for an agreed protocol to perform adjustments. Strong link with SG39 and follow-up SG (being finalized).

### **Area 3: Propagation of Uncertainty & Integral Experience**

- Low fidelity covariance data
- Propagated uncertainty versus observed spread in C/E values.
- Can we handle other probability distributions for nuclear data uncertainty? *Joint effort with Area 1, Area 4.*
- Validation of covariance data? Performance. *Joint effort with Area 4.*
- Can we begin to fill in cross-correlations with feedback techniques from Integral Experiments? Energy, reaction, isotope? *Joint effort with Area 2.*

### **Area 4: Formats / Interpretation / Processing Error**

- Upper limit and consequences of error from processing codes.
- Documentation of covariance evaluation technique. Use LANL document as a start.
- Documentation for clear interpretation.
- Verification: positive definite, robust, stable to numerical errors. What algorithm to eliminate negative eigenvalues. They affect cross section adjustments.
- Other statistical distributions for nuclear data uncertainty. *Joint effort with Area 1 and Area 3.*
- Identify a place to save/preserve evaluator covariance plots and tables.
- Validation of covariance data? *Joint effort with Area 3.*
- How integral validation can apply both to central values and to covariance data of cross sections? Joint effort with SG39 and successor.

### **Other Areas**

- What will we not study?