

# Uncertainties in Experiments: A Collaborative Project

Donald L. Smith  
(representing all the collaborators)

Argonne National Laboratory  
*CSEWG-2009*

# Description of this Project

- The collaborators who are participating in this project are of the opinion that insufficient attention has been devoted to the methods for estimating, documenting, and reporting uncertainties in nuclear data measurements.
- The objective of this project will be to investigate various aspects of this issue, especially as they relate to the use of experimental data in evaluations, with the intent of eventually documenting this work in a journal article to be submitted for publication in a future issue of *Nuclear Data Sheets*.

# Project Collaborators

- Don Smith – ANL
- Bob Haight – LANL
- Yaron Danon – RPI
- Arjan Plompen – IRMM (Geel)
- Peter Schillebeeckx – IRMM (Geel)
- Nikolay Kornilov – Ohio University
- Mamoru Baba – Tohoku University

# Preliminary topical outline (1)

- Basic principles of experimental nuclear data uncertainty quantification.
- How experimental data and their uncertainties are employed in contemporary nuclear data evaluations.
- Propagation of basic experimental uncertainties to derived physical parameters.
- Modeling of neutron experiments for uncertainty quantification.
- Sources of uncertainties of typical parameters encountered in neutron experiments.
- Proper handling of uncertainties in the measurement standards employed in neutron experiments.
- Examples of uncertainty quantification for a few simple, hypothetical experiments.
- Examples of uncertainty quantification for several actual neutron experiments.
  - A specific list of particular experiments that are representative of broader categories of such experiments will need to be prepared.

# Preliminary topical outline (2)

- Suggestions on how to insure that uncertainty data estimated at a basic level in the measurement process are not lost or corrupted through transitioning to a higher level by the application of complicated data analysis procedures.
- Guidelines for adequate reporting of experimental data uncertainties as required for modern evaluation applications.
- Can unreported uncertainty components for older experiments be resurrected (estimated) from the collective experience of contemporary experimenters who are familiar with such experiments based on existing documentation?
  - This is a VERY difficult issue to address, but it is also especially important given the current state of the experimental database in EXFOR.
- Suggested options and approaches for adequately reporting experimental uncertainties: e.g., journal articles, detailed laboratory reports to supplement journal articles, EXFOR, etc.
- Educating the next generation of experimenters in proper estimation, handling, use, and reporting of data uncertainties.

# **Time frame for this project**

- It is estimated that the conduct of this research project – which represents a part time activity for all the participants – will likely take a minimum of one year, and most probably at least two years to complete the work and prepare the manuscript for the intended journal article.

**Comments and suggestions?**