

Joliot-Curie School 2014

**Mini-workshop on
Evaluation Process: from the Data to Evaluated Files**

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In this mini-workshop, we will work on a very practical example of a modern nuclear data evaluation. In recent years, important efforts have been devoted to the evaluation of the Prompt Fission Neutron Spectrum (PFNS) and Prompt Fission Neutron Multiplicity (PFNM) for important actinides and for incident neutron energies from thermal up to 20 MeV. After briefly reviewing basic concepts on the physics of prompt fission neutrons, we will perform an evaluation of the PFNS in the neutron-induced fission reaction on Pu-239.

We will make use of modern evaluation codes, and use the framework provided by IPython Notebooks to deliver this course. Hands-on, step-by-step instructions will be provided to perform a complete evaluation, including how to:

- Retrieve experimental data from the Nuclear Data Center and IAEA servers
- Retrieve evaluated files from ENDF libraries
- Analyze differential experimental data and old publications
- How to deal with discrepant data sets
- Evaluate a covariance matrix
- Run a modern nuclear reaction code (e.g., CoH, TALYS, EMPIRE)
- Use Bayesian statistical inference tools
- Produce results in ENDF and GND (XML) formats

Because of time constraints, for each item, we will work on one specific example, while more complete files and documentations will be provided separately.

During this course, we will introduce notions pertaining to: nuclear reaction mechanisms, statistical techniques, Bayesian inference, and XML format. A basic knowledge in these domains would be useful, but is not required. Some notions of the Python programming language would also be useful, but again, not required.