

# PhD Proposal

## Study of the Photon Strength Function of Actinides

Start: October or November 2017  
Duration: 3 years  
Funding: CEA fellowship  
Place: Irfu, CEA Paris-Saclay, France

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### Summary

In nuclear energy applications, it is important to know the gamma flux and intensity from the sum of all nuclear reactions. This is only possible if databases are complemented by the results of nuclear reactions models. In the framework of the statistical model, the gamma de-excitation of a nucleus depends on the spin-parity, level density and the so-called photon strength function. The latter can be studied by measuring the gamma de-excitation cascade of the nucleus with a calorimeter. Within the n\_TOF Collaboration at CERN, the Total Absorption Calorimeter (TAC) is a gamma  $4\pi$  calorimeter used for the study of neutron-induced reactions. Measurements with  $^{233}\text{U}$  and  $^{234}\text{U}$  targets provide information on the multiplicity and energy of capture and fission gammas that can be compared with numerical simulations. The latter will be performed with a Monte Carlo code (GEANT4) using gamma multiplicities and spectra calculated by specialized codes, such as DICEBOX (for capture gammas) and FIFRELIN, GEF (for fission gammas). Simulations will be improved and validated thanks to the data measured with the TAC. In particular, the results for uranium isotopes will help understand the evolution of their characteristics with the number of neutrons, and in particular those of the photon strength function. The subsequent improvement of nuclear reaction codes will make possible to update and complement evaluated databases.

### Working environment

The PhD work will be co-supervised by physicists from the Nuclear Physics Department of CEA Paris-Saclay and by the Reactor and Fuel Cycle Physics Department of CEA Cadarache. The analysis of the data will be done in the framework of the n\_TOF Collaboration.

### Application deadline: **April 17, 2017**

Students interested in this position are invited to send a detailed CV as well as the transcript of marks obtained during the Bachelor and Master studies to [emmeric.dupont@cea.fr](mailto:emmeric.dupont@cea.fr)