

June the 16th of 2014,
D. Regnier, regnier2@llnl.gov
N. Dubray, noel.dubray@cea.fr
N. Schunck, schunck1@llnl.gov
C. Schmitt, christelle.schmitt.ganil.fr

David Regnier - Activity report

The LLNL/CEA-DAM collaboration on a microscopic description of fission dynamics:

In the past three decades, the Time Dependent Generator Coordinate Method (TD-GCM) has shown good potential to describe the dynamics of the fission process. This microscopic approach yields a time-dependent Schrödinger-like equation that can be solved numerically. Its application to realistic cases has, however, often been limited by its high computational cost. In an effort to overcome these numerical limitations, a collaboration has been initiated by the Lawrence Livermore National Laboratory (N. Schunck) and the CEA-DAM (N. Dubray). I was hired in the framework of this collaboration and will be working one year at LLNL (2014) and one year at CEA-DAM (2015).

Purpose of the meeting in France:

The collaboration has recently been developing a finite element solver for the Time-Dependent Generator Coordinate Method (TD-GCM). Our goal is to take advantage of the standard refinement methods associated with the finite element analysis in order to boost calculation efficiency. The main features of this code have been extensively and successfully tested on several toy-models such as the evolution of a wave packet in a harmonic oscillator potential. However, a few elements (namely the flux calculation) are still in a development and/or testing phase. My visit in France aimed essentially to:

- discuss and improve these last elements with N. Dubray,
- present the on going work to the CEA-DAM group,
- explore possible collaborations with Christelle Schmitt at GANIL to combine the microscopic approach and the Langevin description of fission dynamics

Activity report:

From June the 2nd to 6th, N. Dubray and I worked at Ganil. We focused essentially on improving the flux calculation part in our calculation. We also tackled several specific points of our TD-GCM code implementation (architecture, library choices, inputs/outputs format...). In addition we took the opportunity of this stay at GANIL to have a fruitful discussion with C. Schmitt. Eventually, this discussion will result in a collaborative work between LLNL, CEA-DAM and GANIL, aiming to compare the Langevin technique and the TD-GCM for predicting fission dynamics. Finally, we had the chance to make a tour of the GANIL experimental facility.

From June the 12th to the 13th, I visited the CEA-DAM group at Bruyères-le-Châtel. I gave a seminar on the ongoing progress of our TD-GCM solver and discussed with M. Verrière and P. Dos-Santos-Uzarralde the evaluation of uncertainties in our TD-GCM calculations.

Aknowledgement:

We would like to thank FUSTIPEN for supporting this meeting opportunity. Finally, we acknowledge the GANIL team for their warm welcoming and their time spent with us to visit the experimental facility.