

Diploma work in applied nuclear physics

Modelling of detector response of neutrons from a fusion plasma in a time-of-flight spectrometer

Introduction

The fusion group of the Division of Applied Nuclear Physics at Uppsala University is looking for diploma students. The group is operating in Uppsala, Sweden, and has its roots in neutron instrumentation for fusion energy research. The group is involved in various parts of the European fusion research program; the development and data interpretation of several neutron detectors, the [neutron camera at MAST](#), Oxford, as well as the two neutron spectrometers [TOFOR](#) and [MPRu](#), at [JET](#), Oxford; and modelling of fusion plasma behaviour.

The proposed diploma work concerns development work for the TOFOR spectrometer. TOFOR is a time-of-flight spectrometer that measures the time it takes for neutrons to fly between one set of detectors (called "S1") to another set (called "S2"). The flight time is related to the energy of the neutrons. Hence, a measured time-of-flight spectrum is related to the energy spectrum of the neutrons emitted from the plasma. This energy spectrum, in turn, reflects various properties of the fuel ions in the plasma, such as their temperature.

Project description

The data acquisition of TOFOR has recently been updated to a fully digital system, ToFu. ToFu is using the same detectors as TOFOR. The new data acquisition system allows for more accurate time of flight measurements as well as simultaneous measurements of the time and deposited energies in the neutron detectors.

The simultaneous measurement of the time-of-flight and energy deposition allows for advanced data analysis if the energy scale of the detection technique is determined. This diploma work is meant to initiate the work of determining that energy calibration by simulating the detector response from typical fusion plasma, using particle transport codes (such as MCNP or GEANT4).

Who are we looking for?

- You have taken courses in nuclear physics.
- You have basic knowledge of modelling of physical process.

Contact

If you are interested in this project, please contact Jacob Eriksson (jacob.eriksson@physics.uu.se) or Erik Andersson Sundén (erik.andersson-sunden@physics.uu.se).