

BEAM REQUEST at the Bucharest TANDEM

Experiment title: Study of deuterium in tungsten matrix by AMS

Experiment Responsible: Petre Alexandru,

E-mail address: alexpetre@nipne.ro

Beam time request (unit=8 hours) : 9

Desired Period: 3-4 days

Desired beam properties : Type: deuterium, Energy(MeV): 7-8 MeV

Today's Science and technology uses a wide range of materials as needed. Therefore, materials science constantly analyzes the potential for new materials that are required by various researches and new technologies.

It is of major interest to obtain the diagnosis of materials used for the construction and protection of the first wall of a tokamak and in particular, of the divertor system. This happens in thermonuclear fusion reactors like JET - England, ASDEX - Upgrade – Germany and Tore Supra - France.

Special tiles cover the inner surface of the vessels of fusion reactors. In order to improve and upgrade these tiles analysis of elemental composition and profilometry are required. W, C and Be are the frequently used materials.

AMS is an ultra-sensitive diagnostic tool for nuclear fusion experiments and will be used in such investigations. It is able to perform bulk and depth profiling measurements of tritium and deuterium concentrations in different materials. In this way it is able to provide the toroidal and poloidal distribution of tritium in the tokamak installation, the quality of plasma confinement and stability. Also, more information concerning the positions in which disruptions occur, plasma instabilities (ELM - edge localized modes) and the effects on plasma after injection of energy by using neutral beams, and pellets can be obtained.

According to the relationship between energy and range the depth profiling of isotopes concentrations give the value of the incidence energies of the particles.

To obtain the experimental data necessary for the thesis entitled "Application of accelerator mass spectrometry to the study of materials of interest to thermonuclear fusion" is necessary to obtain beam time for employing the AMS analysing method. Samples will be measured using accelerator mass spectrometry. These samples will be made in collaboration with the "Plasma Processes, materials and surfaces " group of the INFLPR institute.

There will be made a series of samples consisting of silicon wafers that will be submitted in multiple layers of tungsten in plasma discharge. The samples will be obtained by deuteration actions.

The aim is to achieve in the laboratory a series of materials that simulate the materials used in fusion technology.

This is the first experiment proposal in this PhD.