We are looking for a young and motivated student for a PhD position at Microanalyitical center at Jozef Stefan Institute, Slovenia. The work would be related to fusion research. Fusion is seen as a new energy source for the future generations. It has been a lot talked and written about fusion lately, mainly due to the construction of a new experimental fusion reactor ITER https://www.iter.org/ in France.

In our laboratory https://f2.ijs.si/en/laboratories/2020070311053036/laboratory-for-fusion-research we are studying retention of hydrogen isotopes in the material at different exposure condition where we want to simulate the conditions that will take place on the walls of the fusion reactor. Our aim is being able to predict how much hydrogen isotopes will be retained in the walls of the fusion reactor, under certain exposure conditions and to understand the mechanisms responsible for that. Our work takes place in the framework of EUROfusion consortium. In 2021, we also received a new European project (https://f2.ijs.si/en/projects/2021102115250844/detection-of-defects-and-hydrogen-by-ion-beam-analysis-in-channelling-mode-for-fusion-%E2%80%93-dehydroc), with which we want to study the defects in the crystal lattice in tungsten single crystals and how these defects affect the retention of hydrogen in such damaged material.

The work would take place in an experimental station on 2 MV tandatron accelerator https://f2.ijs.si/en/infrastructure/2020071509342251/mic--microanalytical-centre , in a dynamic and relaxed environment. It would mainly include experimental work on a beam line intended for the study of hydrogen retention.

Possible topic for the doctoral thesis: The candidate would study the defects in the crystal lattice of the material caused by high-energy particle bombardment and consequently impact of these defects on the retention of hydrogen isotopes in the materials. As part of the doctoral topic, the candidate would develop a new analytical technique in the existing experimental setup that will allow the detection of defects in the crystal lattice and the amount of hydrogen trapped in the defects. The work would include lab work and modelling of physical processes. Possible start is autumn 2022.

Contact: sabina.markelj@ijs.si

References related to our work:

Pečovnik, M., Hodille, E.A., Schwarz-Selinger, T., Grisolia, C., Markelj, S., 2020. New rate equation model to describe the stabilization of displacement damage by hydrogen atoms during ion irradiation in tungsten. Nucl. Fusion 60, 036024.

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Markelj, S., Založnik, A., Schwarz-Selinger, T., Ogorodnikova, O.V., Vavpetič, P., Pelicon, P., Čadež, I., 2016. In situ NRA study of hydrogen isotope exchange in self-ion damaged tungsten exposed to neutral atoms. Journal of Nuclear Materials 469, 133–144.