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The NEutron-induced POsitron source MUniCh (NEPOMUC) at FRM II at the TU München provides the worlds most intense anti-matter beam. In addition the positron physics research group operates further experiments sourced by β^+-emitters in its laboratories at the physics department. These cover a wide range of topics ranging from basic to material science.

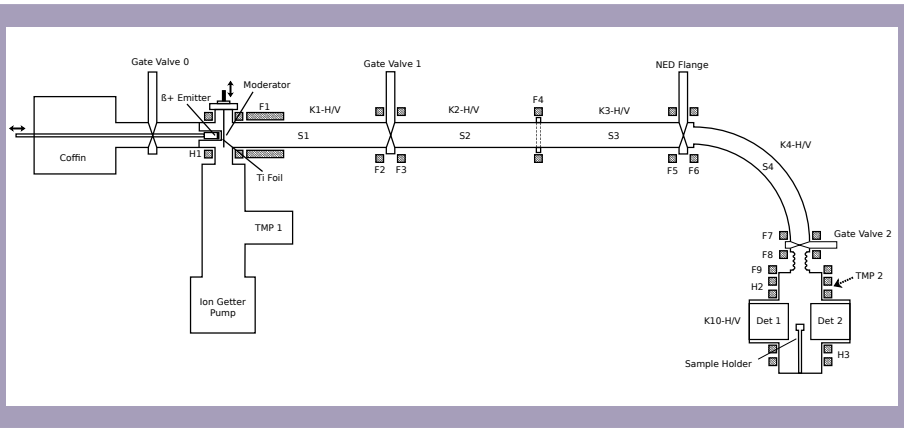
Bachelor Thesis

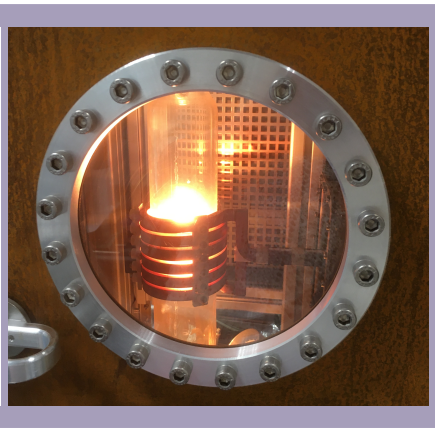
Measuring the Atomic Vacancy concentration in a quenched Tungsten Mono-crystal by Doppler-broadening of the Positron-annihilation line.

Doppler-broadening spectroscopy (DBS) of the positron annihilation line with a mono-energetic positron beam is a highly sensitive method to characterize lattice defects within the first few microns of a sample. The creation and behaviour of atomic level defects in tungsten is of interest in the context of nuclear fusion research where tungsten is used to shield the inside of the plasma vessel from the high particle and heat loads emitted by a fusion plasma. A material close to its melting point contains a non-negligible thermal vacancy concentration. This can be 'frozen in' by cooling down a sample very fast from a temperature close to its melting point. The vacancy concentration created by this process is not homogeneously distributed in space as vacancies are mobile at high temperatures.

The goal of this work is to verify the vacancy distribution calculated theoretically from the cool down curve of a sample. Since the probing depth ($\approx 1.5\,\mu m$) of DBS is smaller than the depth beyond which the defect concentration is expected to level out (a few 10s of µm), it will be necessary perform multiple DBS measurements with intermittent removal of a layer from the surface of the sample ($1\,\mu m$ to $10\,\mu m$).

The samples preparation and the quenching procedure will be performed at the labs of the workgroup Ion Beam Analysis and Modification at the MPI for Plasma Physics.





During your thesis work you will get first hand experience in a collaborative research project run jointly by two applied physics facilities. You will have opportunity to apply the skills you gained in the previous semesters as well as acquire new ones.

For questions or in order to apply please contact Vassily V. Burwitz or Prof. Christoph Hugenschmidt.

When applying online please send us your documents collected into a single PDF file.