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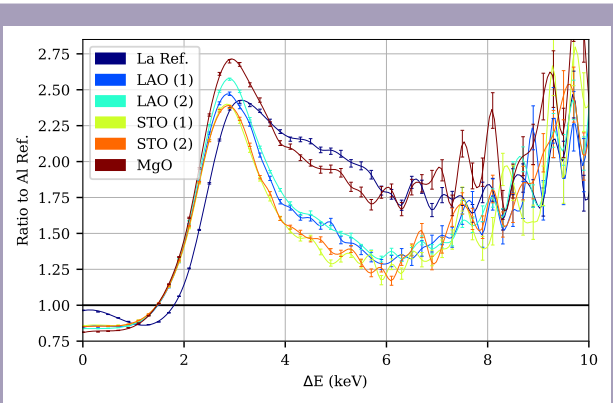
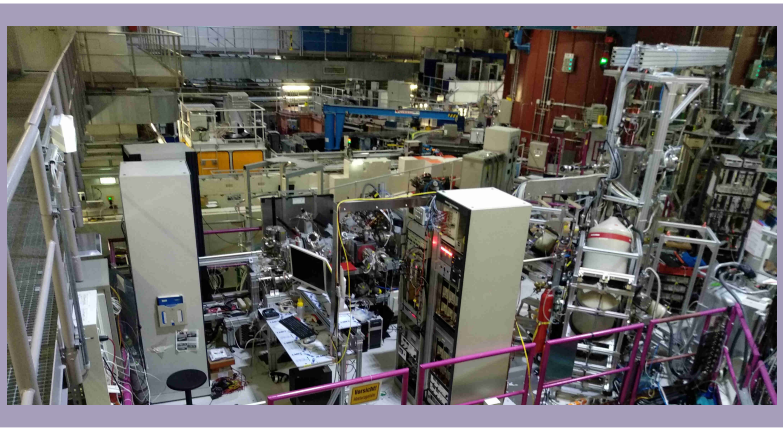
The NEutron-induced POsitron source MUniCh (NEPOMUC) at FRM II at the TU München provides the worlds most intense anti-matter beam. In addition the positron physics research group operates further experiments sourced by β^+−emitters in its laboratories at the physics department. These cover a wide range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

Master Thesis

Calculation of the Electron-Positron Momentum Distribution at Lattice Defects

The characterization of lattice defects with respect to their chemical environment is of outmost interest in condensed matter physics and materials science. In Coincidence Doppler-Broadening Spectroscopy (CDBS), both annihilation quanta are detected simultaneously with two high-purity germanium detectors. The resulting background suppression enables the detection of large momenta of core electrons (large Doppler-shifts) in the outer wings of the 511 keV annihilation line. Therefore, CDBS is applied to identify the elements at the annihilation site and hence enables the detection of, e.g., foreign atom-vacancy complexes or precipitates in alloys. Within this thesis CDBS spectra resulting from positron annihilation in point defects will be calculated by using the open-source code ABINIT. This program is based on density functional theory (DFT) and allows the computation of electron and positron densities as well as wave functions in the solid. The calculated positron lifetimes and positron-electron momentum distributions are compared with experimental results.





Working in our group you will have the chance to experience, applied physics research at first hand while collaborating with both engineers and scientist. Also you will gain insight into the way a large science facility is operated.

Please send applications to Leon Chryssos or Prof. Christoph Hugenschmidt. If you apply online, please send the documents collected in one PDF file.

MLZ ist eine Kooperation aus:
JÜLICH Forschungszentrum
Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung
Technical University of Munich