

FAKULTÄT für PHYSIK
LUDWIG-MAXIMILIANS-UNIVERSITÄT
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT
TECHNISCHE UNIVERSITÄT MÜNCHEN
MÜNCHEN/GARCHING

MLL-KOLLOQUIUM

Donnerstag, 02.05.2013, 16¹⁵ Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1
Treffen zum gemeinsamen Kaffee 16 Uhr

Prof. Günther Dollinger

(Universität der Bundeswehr, München)

New Detectors for Positron Annihilation Spectroscopy

The positron is the ideal probe for non-destructive detection and characterization of atomistic defects in solids. Analysis of the positron lifetime and energy and angular distribution of the annihilation radiation yields information about type and concentration of vacancies, vacancy-clusters, dislocations, grain boundaries, surfaces, voids and precipitates and the chemical environment of the defects. We operate the pulsed low energy positron system PLEPS at the high-intensity positron source NEPOMUC at the FRM II as a tool for depth-resolved positron lifetime measurements. To enhance the defect characterization sensitivity of PLEPS, we develop a new detector system to measure simultaneously the entire 3D-momentum distribution of the annihilating electron and the corresponding lifetime of the positron (4D-AMOC):

- For the time and spatially resolving detector we develop an MCP-based UV-light detector with two MCP-stages coupled to a BaF₂ scintillator. As an alternative to the MCP-based detector, silicon photomultipliers are also envisaged and tested.
- For the energy and spatially resolving detector, it is planned to measure the energy along with the angular deviation of the annihilation radiation by means of a 36-fold pixelated planar germanium detector. A lateral position resolution of 1.1 mm was obtained for a 48 x 48 mm² size detector with high energy resolution.

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