

MM 35 Hauptvortrag Karl Maier

Zeit: Dienstag 09:45–10:15

Raum: TU H1058

Hauptvortrag

MM 35.1 Di 09:45 TU H1058

Prediction of material fatigue — •KARL MAIER — Helmholtz Institut für Strahlen und Kernphysik, Nußallee 14-16, 53115 Bonn

About 30 years ago positron annihilation became a useful tool in basic metal research eg. vacancy formation enthalpies of nearly all metals could be measured with high precision in thermal equilibrium. In the meantime the experimental techniques and the theoretical understanding developed to a high standard. Position resolved measurements with a resolution of a few microns are now possible in a standard laboratory.

The consequent next step is to take laboratory techniques and knowledge into an industrial environment. There are many relevant material problems which can be solved with positron annihilation. Without any sample preparation, plastic zones in front of fatigue cracks are visible in a non-destructive way. First precursors of material failure at extremely low concentrations can be used to estimate the fracture within only 1% of cycles in a Wöhler experiment. Examples in light alloys, ferritic and austenitic steels are discussed.