



PHYSIKALISCHES KOLLOQUIUM

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Plasmas Facing Materials for Fusion - From Challenge to Realisation

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The development and qualification of viable material solutions is an essential ingredient for the realization of sophisticated future energy systems e.g. for use in the high heat flux loaded areas in a future fusion power plant. The extremely challenging operating conditions include very high simultaneous power and particle loads

and high neutron fluxes.

Here especially the issue of melting and power-handling of metallic components is particularly complex under the conditions in a fusion device. Tungsten (W) is currently the main candidate material as it is resilient against erosion, has the highest melting point, shows benign behavior under neutron irradiation, and low tritium retention. Despite the beneficial properties of tungsten issues for operation of a fusion devices remain. Firstly it was established that melting under fusion conditions as well power-handling of W-components is understood to the degree that special shaping and control needs to be applied, to mitigate the heat-flux to the exposed surfaces and edges future devices. Secondly based on the magnitude of transient power loads in fusion devices new materials need to be designed. These materials even though not resilient to melting will have to allow cracking of PFCs to be mitigated. Transients of large enough size and numbers do facilitate material fatigue, cracking, and thus decreased thermal performance. Efforts to establish new advanced plasma-facing material options are moving forward focusing on crack resilient materials with low activation, minimal tritium uptake, long lifetime and low erosion. Rigorous testing and qualification is required with respect to heat-exhaust, thermal fatigue, cyclic loading and plasma wall interaction.

Einführung: Priv. Doz. Dr. C. Linsmeier

Die Fakultät lädt alle Interessierten herzlich ein.