

Aushang

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Einladung zum Seminar über „Nukleare Energieerzeugung“

Zeit: Montag, 09. November 2026, 11:00 Uhr

Ort: Karlsruher Institut für Technologie, Hermann-von-Helmholtz-Platz 1
76344 Eggenstein-Leopoldshafen, INR, Bau 521, Raum 302

Referent: Herr Gaurav Verma, Karlsruher Institut für Technologie, INR

Titel: Assessment of First Wall Manufacturing Technologies for Fusion Breeding Blankets:
From ITER TBM to DEMO

Abstract:

In fusion reactors, the Breeding Blanket (BB) is essential for both heat extraction and tritium breeding. Within the BB, the First Wall (FW) which forms the plasma-facing boundary is one of the most critical and technologically challenging components to manufacture as it is subjected to extreme operating loads. Extensive research over the past three decades mostly among ITER member states has focused on developing robust FW manufacturing technologies for various Test Blanket Module (TBM) and DEMO concepts, especially those utilizing Reduced Activation Ferritic Martensitic (RAFM) steels. Reported fabrication routes include conventional processes such as Electrical Discharge Machining (EDM) + cold forming and Hot Isostatic Pressing (HIP) as well as emerging additive and hybrid methods such as Selective Laser Melting (SLM) and Cold Spray deposition. This seminar aims to provide a comprehensive overview of the various FW manufacturing technologies. To assess the technological maturity and practical applicability of these approaches for DEMO scale FW manufacturing, a comparative evaluation has been carried out using five key criteria relevant to component production: manufacturability, industrial scalability, production quality, cost-effectiveness, and its coverage in nuclear codes and standards (C&S). The evaluation indicates that conventional technologies such as EDM + forming and HIP-based manufacturing routes for U-shaped FW designs currently demonstrate relatively higher maturity compared to the recently emerging additive and hybrid manufacturing techniques. For the non-typical Japanese “O” Cylindrical blanket configuration, conventional forging-based FW manufacturing remains the most mature solution. However, it is constrained by the reliance on fusion welding for joining pressure boundary components, which introduces concerns regarding joint reliability. To address this limitation by eliminating fusion welds in the FW pressure boundary region, a novel modular Monoblock configuration recently developed at KIT has been presented and its advantages over other FW manufacturing technologies is highlighted.

Hinweis: Alle auswärtigen Besucher des Seminars werden gebeten, ihren gültigen Personalausweis oder Reisepass mitzubringen