



SEMINAR

22nd December 2017 - 10:00 a.m.

CFEL-bldg. 99, seminar room IV (O1.111)

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High power microwave research at KIT: a journey towards multi-megawatt fusion gyrotrons and industrial microwave processes

The Institute for Pulsed Power and Microwave Technology (IHM) at Karlsruhe Institute of Technology (KIT) is doing research in the areas of pulsed power and high-power microwave technologies. Considering high power microwave research, in the focus are megawatt-class RF sources (gyrotrons) for the Electron Cyclotron Resonance Heating (ECRH) systems of the Stellarator Wendelstein 7-X at Greifswald and the International Thermonuclear Experimental Reactor (ITER) at Cadarache, France. In frame of the HORIZON2020 EUROfusion program IHM is involved in the research of gyrotrons for the DEMONstration Fusion Power Plant that will follow ITER. Following the requirements for an Electron-Cyclotron Heating and Current Drive (ECH&CD) system for DEMO and future FPP, it will be mandatory to develop multi-megawatt RF sources (gyrotrons) which will allow RF power levels of significantly above 1 MW CW; operating frequencies above 200 GHz; multi-purpose operation at different frequencies; and fast frequency step-tunable operation for frequency steering of the RF output beam in the plasma. To fulfil those requirements, beside the research and development on conventional-type megawatt-class hollow-cavity gyrotrons for today's plasma experiments the focus is on the development and verification of the European coaxial-cavity gyrotron technology which shall lead to gyrotrons operating at an RF output power of approximately 2 MW CW and at an operating frequency of up to 240 GHz in near future. The new world-wide unique KIT gyrotron teststand will be the key research infrastructure for the verification at long pulses and frequencies above 170 GHz. Owing to the selective and volumetric nature of dielectric heating the application of microwaves enables faster and more energy efficient processing in various fields of industrial applications. As a spin-off from the research of high power microwave sources for plasma fusion research, IHM is working on energy efficient industrial microwave processes therefore. Applications ranges from microwave chemistry to the ablation of bio shields of nuclear fission reactors. The presentation will take the audience onto a trip through the different interesting fields of high power microwave research at KIT.

Host: Franz Kärtner – CFEL-DESY Ultrafast Optics