HITEC Day

Title: **Fusion**

Date: **30 November 2015**

Time: **9:00 –17:30**
afterwards Dinner at Brasserie Hermann

Location: **Max-Planck-Institut für Plasmaphysik, IPP Greifswald**

Nuclear Fusion is one of the options for a long term energy source. The way to a continuously operating power plant is based on the magnetic confinement of a high-temperature plasma. Most promising are toroidal geometries. In a tokamak equilibrium is ensured by a large toroidal plasma current. In a stellarator the confining magnetic field is solely produced by currents in coils around the plasma. Up to now, the best confinement properties have been obtained with tokamaks with their rather symmetric properties; the International Thermonuclear Experimental Reactor ITER follows this way. However, the issues related to the toroidal plasma current and current driven instabilities are possible obstacles on the way to a tokamak power plant. Stellarators – on the other hand – with no need for current drive are inherently capable of steady state operation. So far they showed a high operational reliability but the necessarily 3-dimensional magnetic topology requires elaborate physics and engineering optimization. The superconducting Wendelstein 7-X is the first stellarator with fully optimized magnetic configuration designed for steady-state operation.
The seminar will introduce the basics of nuclear fusion and magnetic confinement and show the current status of research. The fusion experiment Wendelstein 7-X will be presented including the opportunity of a tour of the experimental hall.

You will learn about:

- the basics of plasma physics and nuclear fusion and the current state prior to ITER
- properties of Stellarator plasmas and the optimization criteria which led to W7-X
- the challenges in developing materials for nuclear fusion

Contents:

- fusion plasmas
- Magnetic Fusion devices
- Stellarator optimization
- material research in view of a fusion power plant

Who should attend:

HITEC Ph.D.-fellows;
Postgraduate-, Ph.D.- and postdoctoral fellows from the fields of energy and climate research

HITEC Days

HITEC Days are an inherent part of the graduate school Helmholtz Interdisciplinary Doctoral Training in Energy and Climate Research (HITEC). They devote a whole day to a method or a scientific topic with lectures and discussions. The methodological days serve to encourage scientific interdisciplinarity and will enable the PhD students to extend their range of methods with respect to their own scientific work. HITEC Days always end with a ‘Get together’, some snacks and drinks. HITEC Days are open for HITEC Ph.D. students and other interested young scientists.