P 20: Hauptvorträge Lauber, Krämer-Flecken

Zeit: Donnerstag 11:10–12:10 Raum: HS Biochemie (groß)

Hauptvortrag P 20.1 Do 11:10 HS Biochemie (groß)

Fast-particle-driven modes in fusion plasmas — •Philipp Lauber, Sibylle Guenter, Michael Bruedgam, Manuel Garcia-Munoz, Valentin Igochine, and Mark Maraschek — Max-Planck-Institut fuer Plasmaphysik, Boltzmannstr 2, 85748 Garching

On the way to a comprehensive understanding of the properties of a burning plasma the physics of super-thermal particles due to external heating and fusion reactions plays a key role. Therefore, dedicated experimental investigations in this field on present day tokamaks and their theoretical understanding and modelling are an important step not only for ITER but also for a future reactor device.

Especially Alfvén and Alfvén-acoustic type instabilities are predicted to strongly interact with the fast particle population and to contribute critically to the radial redistribution of the energetic ions. Consequently, the drive, the damping and the saturation mechanisms of these modes need to be studied carefully.

In order to investigate the properties of these modes and carry out detailed comparisons to experimental measurements at ASDEX-Upgrade and other tokamaks, a linear gyrokinetic eigenvalue code is employed. In addition to a non-perturbative treatment of the fast particles it includes full background kinetic effects and therefore allows to calculate both growth and damping rates of kinetically modified low-n MHD modes. Moreover, also mid-n kinetic modes in the coupling regime of shear Alfvén, ion acoustic and drift waves can be examined. For the non-linear evolution, a drift-kinetic hybrid code is used.

Hauptvortrag P 20.2 Do 11:40 HS Biochemie (groß)

Overview on turbulence generated zonal flow shear — •Andreas Krämer-Flecken — IEF-4,Forschungszentrum Jülich, 53425 Jülich, Germany

It is a well accepted conception that small scale turbulent structures can form large scale coherent structures (e.g. zonal flows) via an inverse energy cascade. Examples of inverse energy cascades which lead to the generation of zonal flows can be found in the earth atmosphere, the oceans, planets and in numerous laboratory experiments. The zonal flows create transport barriers and influence the confinement. In plasma physics zonal flows play a crucial role in the regulation of anomalous transport. They are supposed to be the key for a better understanding of transport properties and a starting point for better control of particle- and energy transport with the aim to improve plasma scenarios for future devices as ITER.

Zonal flows are supposed to be generated by Reynolds stresses which itself are produced by drift waves, which can be treated as short lived eddies. The generated shear flow is retroactive on the background turbulence by reducing the eddy lifetime. Compared to the timescale of the turbulence zonal flows vary on a slow timescale.

Beside mean zonal flows the radial decrease of the magnetic field in fusion plasmas causes a nonuniform $E \times B$ flow which produces pressure asymmetries the geodesic acoustic mode. This mode appears at the plasma edge and is studied in large detail on different fusion devices amongst them at TEXTOR. The properties of the mode are discussed and the generation mechanism.