

Plenary Talk

PV III Tue 9:00 Audimax

ASDEX Upgrade tokamak: 30 years of science and technology development for a fusion power plant — ●ARNE KALLENBACH — Max-Planck-Institut für Plasmaphysik, Garching

This year, 30 years of plasma operation at the ASDEX Upgrade tokamak in Garching have been completed. Over these three decades, the world map of fusion research facilities has undergone significant changes. ASDEX Upgrade has delivered numerous contributions towards the realization of nuclear fusion as clean and almost exhaustless energy source. Many elements of the experiment can be regarded as blueprint for a future reactor, like e.g. its tungsten plasma facing com-

ponents and the use of impurity injection for gentle power exhaust. After a short introduction into the basics of nuclear fusion utilizing magnetic confinement and the actually favored reactor design, the talk will address important achievements and remaining obstacles and how they could be overcome. Examples are the rapidly growing understanding of plasma transport and stability, as well as solutions related to the occurrence of repetitive edge instabilities, plasma current disruptions and requirements of steady state operation. In addition to improved physical understanding, the increase of computational power and new numerical tools help in extrapolating the ASDEX Upgrade results to a reactor. Newly developed control techniques may even be directly applicable in any large device.