



PHYSICS COLLOQUIUM

From ASDEX Upgrade to ITER Preparing the Next Step in Fusion Research



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Host: Forest

Nuclear Fusion research has progressed steadily over the past 40 years from small table top experiments to large facilities that allow to create on earth hydrogen plasmas hotter than the centre of the sun. In the area of magnetic plasma confinement, the technological development goes together with huge progress in the understanding of magnetized hot, nearly collisionless plasmas, covering a wide range of phenomena, the most prominent areas being turbulent transport of heat and particles, large scale MHD stability and plasma wall interaction. Based on this the Next Step in fusion research, the ITER experiment, is aimed at generating significant amounts of fusion power, i.e. at least 10 times the external power used to heat the plasma. The talk will briefly review our present knowledge of fusion plasma physics and the related fields and then describe the role of the ITER experiment on the way to a fusion reactor. In the second part of the talk, I will discuss the role of present day fusion experiments in preparing ITER, exemplified by experimental results and plans from the ASDEX Upgrade tokamak, a medium size fusion facility operated by Max-Planck-Institut für Plasmaphysik in Garching. Experimental results from ASDEX Upgrade range from improving central plasma parameters by optimizing confinement and stability properties to the first successful operation of a fusion machine with plasma facing components fully covered by Tungsten, the material foreseen for a fusion reactor, that was achieved in ASDEX Upgrade this year.

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