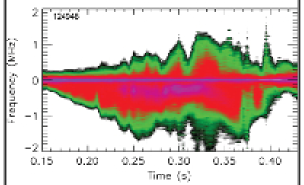
ETG turbulence



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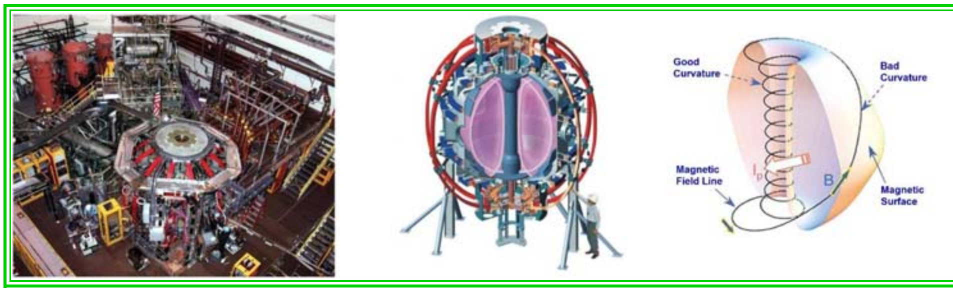
[Operations](#)
[Organization](#)
[Overview](#)
[Program](#)
[Project](#)
[Publications](#)
[Software](#)
[Topical Science Groups](#)
[NSTX Upgrade](#)

National Spherical Torus Experiment - NSTX



Overview

The National Spherical Torus Experiment (NSTX) (pictured and shown schematically above) at the U.S. Department of Energy's Princeton Plasma Physics Laboratory (PPPL) is yielding research results that may open an attractive path towards developing fusion energy as an abundant, safe, affordable and environmentally sound means of generating electricity. The NSTX device is exploring a novel structure for the magnetic field used to contain the hot ionized gas, called "plasma", needed to tap this source of energy. Future fusion power plants will contain plasmas consisting of a mixture of the hydrogen isotopes deuterium and tritium, which can undergo fusion reactions to produce helium, accompanied by a large release of energy, if a sufficient temperature and pressure can be maintained in the plasma using the insulation provided by a suitably shaped magnetic field.

The magnetic field in NSTX forms a plasma that is a torus since there is a hole through the center, but where the outer boundary of the plasma is almost spherical in shape, hence the name "spherical torus" or "ST". The theory of magneto-hydrodynamics (MHD) describing the interaction of a plasma and a magnetic field shows that the plasma pressure needed to produce self-sustaining fusion in a ST can be maintained with a lower magnetic field strength. Since the cost of a fusion power plant will increase with the strength of its magnetic field, successful development of the ST approach to plasma confinement may lead to economical fusion power plants.

The mission of the NSTX is to establish the potential of the ST configuration as a means of achieving practical fusion energy and to contribute unique scientific understanding of magnetic confinement in research areas such as electron energy transport, liquid metal plasma-material interfaces, and energetic particle confinement for ITER burning plasmas. If successful, NSTX could be followed by a larger experiment to explore the issues needed for eventually harnessing fusion power continuously from a reactor. Research on NSTX is conducted by a collaborative research team of physicists and engineers from 30 U.S. laboratories and universities and 28 international institutions from 11 countries.

To find more information about NSTX, please use [this link (2009)](#) or [this link (2006)](#)