PPPL PRINCETON PLASMA PHYSICS LABORATORY

PRINCETON UNIVERSITY

U.S. DEPARTMENT OF ENERGY

Fusion Machines of the World

NSTX-U IS ONE OF AN ELITE GROUP of magnetic fusion facilities scattered across the globe. These powerful and complex machines are advancing mankind's quest to harness fusion as a safe, clean and abundant source of energy for producing electricity. Here is a selection of major facilities.

DIII-D

Location: San Diego, Calif.
Start Date: 1986
Major Radius: 1.66 meters
Magnetic Field Strength: 2.2 teslas

DIII-D is operated by General Atomics for the U.S. Department of Energy with a mission to provide the scientific basis for optimizing the tokamak approach to the production of fusion energy.

Alcator C-Mod

Location: Cambridge, MA
Start Date: 1991
Major Radius: 0.68 meter
Magnetic Field Strength: 5.6 teslas

Alcator C-Mod is a high-magnetic-field tokamak operated by MIT for the U.S. Department of Energy.

National Spherical Torus Experiment (NSTX)

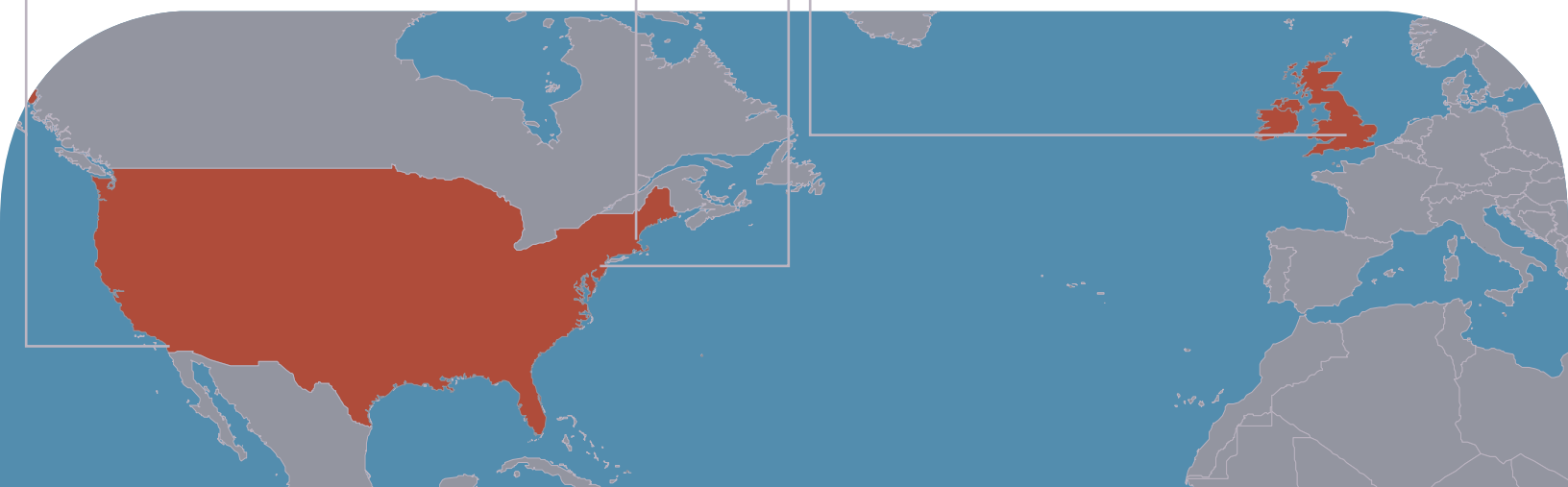
Location: Plainsboro, New Jersey
Start Date: 1999
Major Radius: 0.94 meter
Magnetic Field Strength: 1 tesla

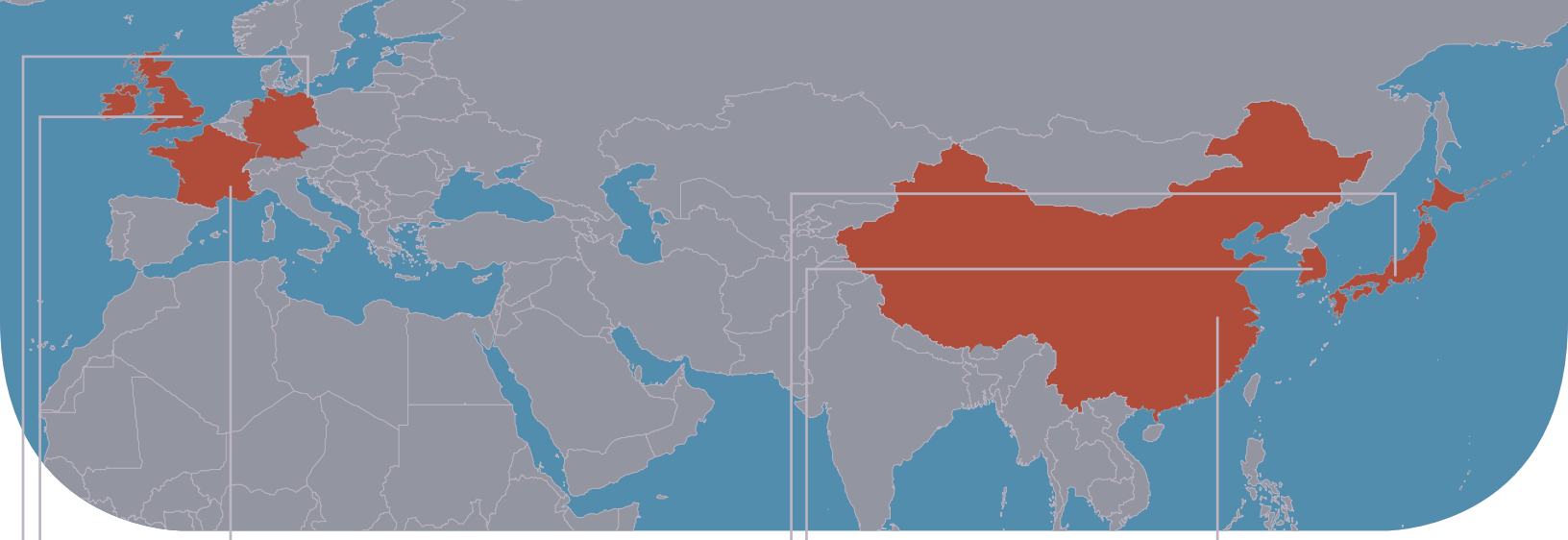
The upgraded NSTX, known as NSTX-U, will operate as the most powerful spherical tokamak in the world.

Joint European Torus (JET)

Location: Culham Centre for Fusion Energy in the United Kingdom
Start Date: 1984
Major Radius: 2.96 meters
Magnetic Field Strength: 3.45 teslas

JET is the largest tokamak now in operation.





ITER

Location: Cadarache, France
Start Date: 2020s
Major Radius: 6.2 meters (The major radius measures the distance between the center of a fusion facility and the center of the plasma.)
Magnetic Field Strength: 5.3 teslas (For comparison, the strength of Earth's magnetic field is around .00005 tesla.)
ITER is an international experiment under construction by countries including the United States to demonstrate the feasibility of fusion power.

Mega Amp Spherical Tokamak (MAST)

Location: Culham Centre for Fusion Energy in the United Kingdom
Start Date: 1999
Major Radius: 0.9 meter
Magnetic Field Strength: 0.6 tesla
MAST is currently being upgraded. Together with NSTX, MAST is one of the world's two leading spherical tokamaks.

Wendelstein 7-X (W7-X)

Location: Germany
Start Date: 2015
Major Radius: 5.5 meters
Magnetic Field Strength: 3 teslas
W7-X is the largest and most advanced stellarator in the world.

Experimental Advanced Superconducting Tokamak (EAST)

Location: China
Start Date: 2006
Major Radius: 0.45 meter
Magnetic Field Strength: 3.5 teslas
EAST, China's main fusion experiment, produces long-pulse, or steady-state, plasmas.

Korean Superconducting Tokamak Advanced Research (KSTAR)

Location: South Korea
Start Date: 2008
Major Radius: 1.8 meters
Magnetic Field Strength: 3.5 teslas
KSTAR is the cornerstone of South Korea's fusion program.

Large Helical Device (LHD)

Location: Japan
Start Date: 1998
Major Radius: 3.5 meters
Magnetic Field Strength: 3 teslas
LHD is a major stellarator with more than 15 years of research accomplishments.