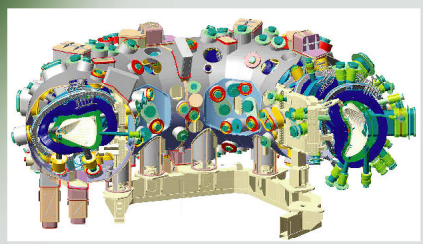
FUSION

IMPLEMENTING AGREEMENTS ON ALTERNATIVE CONCEPTS

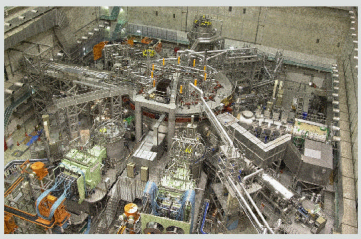
IEA IMPLEMENTING AGREEMENT

WHY ?

- to deepen the understanding of magnetic confinement by study of a wider range of configurations;
- to advance specific configurations towards fusion power application;
- to contribute to the optimization of the power plant.



Wendelstein 7-X



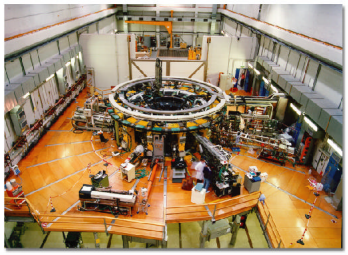
View of the LHD Machine

STELLARATORS

- Breakthrough: good confinement, unmatched density, quiescent high-pressure plasmas achieved in LHD and W7-AS devices.
- Challenge: quasi-symmetric systems can overcome 3-D concept deficiencies; Wendelstein7-X under construction to test it.
- Potential: reactors intrinsically capable of steady-state operation.

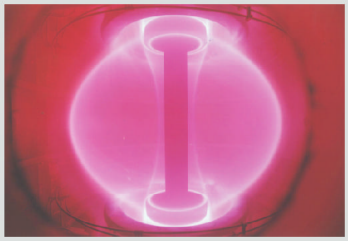
REVERSED FIELD PINCHES

- Research: energy confinement in weak fields self-organized plasmas.
- Breakthrough: turbulence suppression leads to a large confinement improvement under transient conditions.
- Challenge: extension of this to long times and control of plasma instabilities.
- Potential: confinement in weak fields could show ways to higher power density reactors.



View of the RFX Machine

Plasma in START



SPHERICAL TORI

- Research: compact, high power density approach, combining the good confinement and stability of the tokamak with the high plasma pressure of the RFP.
- Breakthrough: prototype experiment START exceeded expectations (high plasma pressure).
- Challenges: plasma exhaust and technology of critical components (centre column).
- Potential: both as a volume neutron source for testing components and as a fusion power plant in its own right.

Participants to the Implementing Agreements:

- **Stellarator: Australia, European Union, Japan, Russian Federation, Ukraine*, USA**
- **Reversed Field Pinch: European Union, Japan, USA**
- **Spherical Tori: European Union, USA**

* Ukraine joined the Agreement in 2002