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High Power Microwave Diagnostic for the Fusion Energy Experiment ITER

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Abstract
Microwave diagnostics will play an increasingly important role in burning plasma fusion energy experiments like ITER and beyond. The Collective Thomson Scattering (CTS) diagnostic to be installed at ITER is an example of such a diagnostic with great potential in present and future experiments. The ITER CTS diagnostic will inject a 1 MW 60 GHz gyrotron beam into the ITER plasma and observe the scattering off fluctuations in the plasma – to monitor the dynamics of the fast ions generated in the fusion reactions. Delivery of complete design of the ITER CTS diagnostic is expected by 2019 including performance and engineering analysis etc.

Schematic of the full ITER CTS diagnostic system

Fusion Energy
Fusion energy is the energy source of the Sun and the stars. Copying the Sun in a power plant on Earth the most viable process would be:

• Fuel would be derived from sea water and lithium
• Fuel supply for a billion+ years
• 25 g of D and T = lifelong energy supply for you
• Secure power plants
• Only waste is the reactor vessel itself
• No long-lived radwaste (~100 years = hands on)

ITER is the next step experimental reactor aiming at producing 500 MW fusion power while heating by 50 MW. Built in France by EU, US, China, Russia, Japan, India and South Korea. Ready in 2025, Cost ~15 G Euro.

European Fusion Energy Roadmap predicts fusion energy to the grid around the year 2050.

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