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## CIXS Diagnostic Components Testing in ITER-like Environment

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# **Princeton Plasma Physics Laboratory**

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## **CIXS Diagnostic Components Testing in ITER-like Environment \***

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The Core Imaging X-Ray Spectrometer (CIXS) diagnostic is an x-ray diagnostic to be used at ITER. CIXS will be located in a diagnostic port arranged at the equatorial plasma mid-plane position and used to measure x-rays from the mid to upper parts of the plasma. This diagnostic is designed to measure ion temperature, impurity density, and plasma rotation as a primary diagnostic. Backup measurement include of the electron temperature profile. Achieving these measurements will require the use of an x-ray detector to take measurements of the incoming x-rays from the plasma.

X-ray detectors will be located in close proximity to the plasma where a crystal will diffract x-rays to the detector unit. Crystals will have a direct line of sight with the ITER plasma. The detector proximity physically to ITER plasma, matched with proximity to line of sight paths with plasma lead to high expected doses of neutron radiation, very high magnetic fields, and temperatures exceeding 200°C during bake out of the vacuum vessel.

In order to validate that the detector and associated electronics will be able to withstand the extremes that are anticipated at ITER, tests are underway in an effort to determine the survivability of these specialized electronics. Survivability is being determined using Pilatus x-ray detectors supplied by Dectris Ltd. tested in a high magnetic field, and a high flux neutron radiation environment to that end. Further plans to test crystal components in high temperatures environments are planned for the near future in order to characterize the behavior of the crystal and substrate, as well as methods to cool these components.

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TOFE Topic: Systems Engineering - Diagnostics

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