Contribution ID: **136** Type: **Poster**

Mechanical Designs for High Magnetic Field Tests for ITER Applications

Monday, 5 June 2017 13:40 (2 hours)

In the ITER (International Thermonuclear Experimental Reactor) program, core imaging X-ray spectrometer (CIXS) and electron cyclotron emission (ECE) are two diagnostic systems in the US ITER project, where X-ray Dectric PILATUS single-photon-counting pixel detectors for X-ray energy and piezo actuators are required to operate under the conditions of high magnetic fields and the accompanying rapid field transient rates. The two devices were tested under the conditions in Princeton Plasma Physics Laboratory. For the tests, a transrex power supply was employed to provide high intensity of magnetic fields (up to 3T), and a series of mechanical devices were designed and made to carry and secure the testing devices in the magnetic field. In addition to structural integrity, material magnetism was a major concern and an analysis of the magnetic properties was carried out. In this paper the testing fixtures are described, mechanical setups, instrumentation, generation of the high magnetic field, safety aspects and procedure are also introduced. With the testing setups, the tests for CIXS and ECE components were successfully completed, and the results are provided to ITER applications.

Eligible for student paper award?

No

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Session Classification: M.POS: Poster Session M

Track Classification: Diagnostics and instrumentation