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High Priority Prototype Testing in support of System Level Design development of the ITER Radial Neutron Camera

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The paper describes the high priority testing activities supporting the ITER Radial Neutron Camera (RNC) design, performed by a consortium of European institutes within a framework contract placed by Fusion For Energy (F4E), the ITER European Domestic Agency.

The main role of the RNC is to measure the uncollided 14 MeV and 2.5 MeV neutrons from deuterium-tritium (DT) and deuterium-deuterium (DD) fusion reactions through an array of flux monitors/spectrometers located in collimated lines of sight (LOS) viewing the plasma through the ITER Equatorial Port Plug #1. The line-integrated neutron fluxes will be used to evaluate the radial profile of the neutrons emitted per unit time and volume (neutron emissivity) and therefore the neutron yield and the alpha particles birth profile.

The activity of high priority testing is dedicated to the preparation, the design of experimental test environment, the conduction of appropriate tests and reporting of test results for the high priority prototypes, clarifying or verifying the expected key functions and system behaviour and enhancing learning on specific issue (potential showstopper).

The activities will focus on the development of experimental test rig, conduct and reporting of test for the high priority prototypes for the following items.

- Neutron Detectors and associated signal read-out equipment;
- Front-End Electronics & Algorithm development;

In addition, the Specific Grant 05 will dedicate effort for studying three conceptual options:

- the adjustable collimator concept
- the segmented detector concept

• environmental impact assessment on appropriate neutron detector technology (He-4, plastic and crystal scintillators)

The paper will also present the results of the first experimental results from the activities carried out in laboratory and in the irradiation facilities.

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Eligible for student paper award?

No

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