

DEVELOPMENT OF DESIGN OPTIONS FOR THE PORT PLUG COMPONENTS OF THE ITER CORE CXRS DIAGNOSTIC

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The ITER core charge exchange recombination spectroscopy (cCXRS) comprises the upper port plug #3 (UPP3) containing a set of optical mirrors. The mirrors transfer the visible light emitted by interaction of the plasma with the diagnostic neutral beam (DNB) to the diagnostic spectrometers.

The paper presents component concepts developed for cCXRS which likely can be used as generic or prototype units. These design solutions are based on the cCXRS layout of 2009 containing the outer shell of the port plug with the shielding cassette carrying the secondary mirrors and the retractable tube carrying the first mirror (M1) and the shutter. The tube allows relatively simple multiple replacements of M1 and shutter without the retraction of the upper port plug. Priority is given to M1, M1 holder, shutter, calibration system and retractable tube.

Before prototyping critical components such as first mirror mounts and shutter, the final conceptual cCXRS design has to be adapted to meet forthcoming ITER upper port plug (UPP) and blanket system changes. The integrated first wall - diagnostic shield module layout, first wall recession, blanket shaping and generic UPP layout have considerable impact on the cCXRS layout and its components. The paper presents preliminary solutions on integration of the customized cCXRS into the expected ITER blanket and UPP layout.

The anticipated short lifetime of the first mirrors (which, according to different sources, can be in the range of several weeks to several months) is subject to intensive R&D. In addition our team consider several alternative design concepts described within separate contributions on the cCXRS. To solve the M1 lifetime issue they consider the changed configuration of the optical system and implementation of a cleaning system.