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P2.050 Testing of the optical chain mock up of H-alpha and Visible Spectroscopy for ITER

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H-alpha and Visible Spectroscopy is one of the ITER first-plasma diagnostics providing full poloidal coverage of plasma scrape-off layer near the first wall. There are two poloidal-view channels in EPP11, one tangential-view channel in EPP12, and one divertor-view channel in UPP02. At the moment, the final design phase is ongoing, requiring proper testing of design solutions to identify the realistic optical parameters and the problems related to the manufacturing, alignment, calibration and stability issues. A full-scale mockup of the whole optical chain has been built for this purpose. It comprises the most important units starting from the in-vessel optical front-end (First Mirror Unit) to the Interspace relay optics (Long-Focus Spectral Telescope), and to the Optical Bench Assembly located in the Port Cell, where the collected light is coupled to the imaging cameras and to the complex optical fiber bundle transmitting it to the various detectors and spectrometers to be located in the ITER Diagnostic Building. The detailed optical design, analyses, benchmarking and test results are reported with a main focus on the alignment/calibration issues, and on the spatial resolution measured. The measurements have been performed in the wide spectral range 450-700 nm, which is required for the monitoring of the H-alpha, Beryllium and other impurity emission profiles with probable local peaks considered as the most important ITER safety-relevant task for the passive visible spectroscopy diagnostics.

Presenter: GORSHKOV, Alexey (International Fusion Projects Coordinating Centre)

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