Contribution ID: **99** Type: **Poster**

Lessons learned on design, manufacturing and commissioning of IRVIS endoscopes prototypes for W7-X divertor temperature monitoring

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

The Wendelstein 7-X fusion experiment at Max-Planck-Institut für Plasma Physik (IPP) in Greifswald produced its first hydrogen plasma on 3rd February 2016. This marks the start of scientific operation. Wendelstein 7-X is to investigate this configuration's suitability for use in a power plant. In order to allow for an early integral test of the main systems needed for plasma operation (magnet system, vacuum, plasma heating, control and data acquisition, etc), one of the five divertor unit (module 5) and most of the carbon tiles covering the wall protection elements are being installed before the next experimental campaign (OP1.2). For the later operation phases, the heat fluxes coming from the plasma will be distributed over an area provided by the plasma facing components (i.e. divertor target plates, baffles). An important diagnostic for W7-X will be thermography systems monitoring the surface temperature of the divertor target plates by collecting and processing infrared (IR) and visible (VIS) light from the divertor region of the plasma. For this purpose the company Thales SESO has been assigned to design, build, test, deliver and install two prototypes of IRVIS (InfraRed-VISible) endoscope systems for the divertor of the W7-X Stellarator. Thermography is part of the operational and protective divertor diagnostics and has to detect signals indicating anomalous operation scenarios. The design of the horizontal and vertical target plates and the baffles in the divertor should keep the local power load below 10 MW/m2. The IRVIS endoscope systems are designed to operate under heavy-duty conditions.

Eligible for student paper award?

No

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Session Classification: M.POS: Poster Session M

Track Classification: Diagnostics and instrumentation