



Contribution ID: 625

Type: **not specified**

P2.053 Engineering design of Wendelstein 7-X alkali metal beam diagnostic observation system

Tuesday, 18 September 2018 11:00 (2 hours)

On Wendelstein 7-X a Sodium beam emission spectroscopy (BES) diagnostic system has been installed in 2017 in order to measure plasma edge density and turbulence. The diagnostic setup consists of two parts: an alkali beam injector and an observation system through which we can observe the light emission by the alkali beam. The observation system consists of two parts, which operate in parallel: a high sensitivity Avalanche Photodiode (APD) camera and an overview CMOS camera. The collected light is divided by a 45° angled mirror, which transmits 2.5% of the light to the CMOS camera while 97.5% goes to the APD camera. The light is focused by an optical lens system and transmitted to APD camera by optical fibres arranged along the observed beam. To achieve sufficiently high photon flux the APD branch contains relatively big lenses (up to 244 mm diameter) therefore a robust lens holder structure had to be fixed onto a 184 mm diameter window flange at the top of the cryostat. The 45° angled mirror had to be exactly positioned to the centre of the optical axis while its holding structure should not cover the way of the light towards the APD branch. Beam light emission occurs at two identically intensive spectral lines separated by 0.5 nm around 589 nm. A Carbon II line is located exactly on one of the Sodium lines, therefore cutting the Carbon emission was possible by measuring only one of the emission lines. A custom designed filter is used, which can be temperature tuned so as at room temperature it transmits both Sodium lines, while at about 60°C the Carbon line and one of the Sodium lines is strongly cut.

Engineering design solutions and technical developments of the W7-X alkali BES observation system are discussed in this paper.

Presenter: NAGY, Domonkos (Department of Plasma Physics Wigner Research Centre for Physics)

Session Classification: P2