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2.23 First results of multi-channel scintillator-based SX diagnostic with P47 scintillator in deuterium plasma experiments of LHD and examination of method for design in EAST

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Multi-channel soft x-ray (SX) diagnostic has been used as a main diagnostic in fusion plasma devices to research MHD phenomena. Semiconductors have been widely used as SX diagnostic in magnetic confinement devices. However, it is difficult to use semiconductors in high neutron flux environment, such as deuterium plasma experiments of LHD, without radiation shielding. Therefore, a new type of SX diagnostic, scintillator-based SX diagnostic has been developed in LHD and EAST. In this type of the diagnostic, an SX from plasma is converted to visible light by the scintillator. The light is then guided to a remote location and measured there by detectors. In this article, first results of scintillator-based SX diagnostic with P47 scintillator in deuterium plasma experiments of LHD and in EAST are reported. The multi-channel system in LHD have observed the fluctuation by MHD instabilities then it can be said that the system have worked as multi-channel SX diagnostic. In EAST, there are two channels for scintillator-based SX diagnostics where one of two channels has SX shield. By comparing two channels, effect of neutrons and gamma-rays can be estimated experimentally. The examination of method to design scintillator-based SX diagnostics have been performed in EAST.

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