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Prospect for a C^{7}LYC based compact neutron spectrometer for the ASDEX Upgrade tokamak

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Neutron emission spectroscopy is an established diagnostic for thermonuclear plasmas. The best proven technique is based on time of flight measurements, as they provide superior performance, but are also rather demanding in terms of machine interface requirements. The recent development of novel compact neutron spectrometers with good n/γ discrimination capability made it possible toγ discrimination capability made it possible to perform neutron spectroscopy measurements also in machines where there is limited space for a large installation, which is often the case of medium-sized tokamaks. In order to improve the suite of neutron diagnostics at the ASDEX Upgrade tokamak, a C7LYC based detector optimized for 2.5 MeV neutrons spectroscopy has been recently developed.

The instrument, named COSMONAUT (COmpact Spectrometer for Measurements Of Neutrons at the ASDEX Upgrade Tokamak) was developed to measure the 2.5 MeV neutron spectrum from deuterium plasmas at the tokamak ASDEX Upgrade and is based on a former prototype detector developed for EAST. In this contribution, we present calculations of synthetic neutron spectra that may be measured in deuterium plasmas heated by neutral beam injection at the ASDEX Upgrade tokamak. These calculations are obtained by simulating the beam slowing down distribution paired with neutron production and transport to the detector position. Simulation results are then used to assess COSMONAUT detection capability.