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4.18 Neutron emission spectroscopy of D plasmas at JET with liquid scintillating neutron spectrometer

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Neutron emission spectroscopy is a diagnostic technique that allows for energy measurements of neutrons born from nuclear reactions. The JET (Culham, UK) has a special place role in this respect as advanced spectrometers for 2.5 MeV and 14 MeV neutrons have been here developed for the first time for measurements of the neutron emission spectrum from D and DT plasmas with unprecedented accuracy. Twin liquid scintillating neutron spectrometers were built and calibrated at PTB (Braunschweig, Germany) and installed on JET in the recent years with tangential-equatorial (KM12) and vertical-radial (KM13) view lines, with the latter only recently operational. This article reports on the performance of KM12 and on the development of the data analysis methods in order to extract physics information upon D ions kinematics in JET auxiliary heated D plasmas from 2.5 MeV neutron measurements. The comparison of these results with the correspondents from other JET neutron spectrometers is also presented: Their agreement allows for JET unique capability of multi-lines of sight neutron spectroscopy and for benchmarking other 14 MeV neutron spectrometers installed on the same lines of sight in preparation for the DT experimental campaign at JET.

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