

Updates for automatic analysis and post-processing of JET neutral particle analysers for TT and DT campaigns

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The data processing from both JET neutral particle analysers (NPA), high energy and low energy detector systems, has been updated for needs of operating in different scenarios with several isotopes in tritium and deuterium plasmas in the 2021 campaigns.

The NPA systems provide the information about neutralised fast ion populations in different energy ranges for H, D, T, 3He and 4He particles. Additionally, the low energy NPA system is one of the key diagnostics for isotope ratio monitoring in TT and DT campaigns (DTE2). Its capabilities for isotope analysis have been demonstrated during H plasma experiments in 2016 and 2019 and data processing is updated to easy-to-use option during 2020 for a fluent process by control diagnostics expert in DTE2. The other important and more traditional application for both, high and low energy detectors, is cross-checking the efficiency of external heating, especially different RF scenarios with a minor population of fast particles.

The NPA data analysis workflow has been systematically applied and demonstrated during scenario development experiments in 2020. This contribution introduces the capability and efficiency of the coupled analysis chain in fast particle diagnostics data checks and post-processing by using JET DTE2 reference shot sub-database.

Automatic processing includes the data monitoring, neutral particle flux per energy channel and interfering high energy tail. Flux and tail temperature fitting is performed via JETPEAK. The JETPEAK is multipurpose database and modelling environment which provides the pre-checked and filtered information of essential plasma diagnostics, e.g. electron temperature, density and Z_{eff} . The database and its applications are available with both Matlab and Python format interface and one of the most important benefits is that it is combining the information from diagnosticians and modellers for more reliable analysis and tools development, especially routinely run or analysis of synthetic diagnostics, even during operations.

*See the author list in E. Joffrin et al., Overview of the JET preparation for deuterium tritium operation with the ITER like wall, 2019 Nuclear Fusion 59 112021

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