EURO*fusion* programme for JET research and future plan (2018-2020)

The EURO*fusion* is a consortium of 28 European countries to develop fusion electricity by 2050. The European fusion programme is organised by the EURO*fusion* along the EU Roadmap, which identifies the remaining key issues for fusion electricity as eight missions; 1. Plasma operation, 2. Heat exhaust, 3. Materials 4. Tritium breeding, 5. Safety, 6. DEMO, 7. Low cost, and 8. Stellarator. The EU Roadmap reviews the present status of each mission, and guides the EURO*fusion* programme [1].

Achieving Q=10 in ITER is a critical path in the EU Roadmap. In order to ensure its success the preparation of operation on EURO*fusion*'s present experiment devices is undertaken as main risk mitigation measures. Joint European Torus (JET) is the flagship device of EURO*fusion* programme, and represents an intermediate step towards ITER operation. With its unique capabilities of Tritium and ITER-Like Wall (i.e. Be main chamber and W divertor), JET research provides the key support for ITER: 1. confirmation of reduced Tritium retention at the ITER-Like Wall, 2. plasma scenario compatibility with ITER-like wall, and 3. optimized Deuterium-Tritium (DT) operation (e.g. isotope effects). Extensive DT technology programme is also accompanied; 14MeV neutron detector calibration using remote handling has been successfully completed in 2017. Efficacy of Shattered Pellet Injection, which is currently the sole strategy for run-away mitigation in ITER, will be tested in 2018.

EURO*fusion* is planning DT experimental campaigns in 2020 on JET with the ITER-Like Wall (JET-ILW-DT) to address key physics and technological issues for the DT experiments in ITER: Baseline and Hybrid operation scenario with DT and ITER-Like Wall, alpha heating, T-cycle technology, and 14MeV neutronics [2]. To achieve the scientific objectives, JET operation should demonstrate 15MW of fusion power for 5 seconds stationary state, a performance never attempted before in fusion-research history. For optimized operation of JET-ILW-DT in 2020, the isotope effects and DT scenarios will be further exploited in the HH, DD, and TT campaigns for 2018~2019.

[1] http://www.euro-fusion.org/

[2] X. Litaudon, et al, "JET program for closing gaps to fusion energy", 26th IEEE Symposium on Fusion Engineering (SOFE), May 31- June 4 2015, Austin Texas, USA