

Research Proposal for the 5th IAEA JOINT EXPERIMENT

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Date: 15 July 2012

(Joint Experiment will be held on September 10- 14, 2012)

Proposed Research Topic:

Tests of HTS performance on GOLEM tokamak

Purposes:

To characterise resistivity dependence of HTS coils on current.

Background:

In the Golem Progress Report “The HTS current driven by a capacitor bank”, figs.13 and 15 show dependence of the joint resistivity with sudden increase in resistivity above 250-300A. Similar performance has been observed during tests of HTS tape performed recently by Oxford Instruments. It is important to get more detailed data at the point of transition – to see whether the transition from superconductivity is sharp or smooth. Comparing the voltage/current curves for the top and bottom coils will show whether the jointing done on the bottom coil has reduced its performance relative to the top coil. We may also see that the character of the transition changes – a damaged superconductor usually has a more gradual transition. Also, it is useful to compare such curves for different in-coil connections with those at feeds. These experiments will also help to understand the outstanding performance of HTS where the measured current exceeded the predicted limit by a factor of three.

Another purpose of these experiments is to understand conditions and consequences of current quenches.

Scope and Method:

We propose to fire several pulses without plasma in the lower and upper coils and measure resistivity of joints and feeds, and coils as a whole. If quenches appear, we will identify the location and precise conditions and characterise quenches in detail.

Needed equipment:

If any extra to existent equipment is needed, it can be provided.

References:

1. Golem Progress Report of 27/01/2012 “The HTS current driven by a capacitor bank”.
2. S Ball et al, Presentation at 39th EPS, Stockholm, June 2012