Contribution ID: **1049** Type: **not specified**

P3.002 ST40: engineering commissioning first results

Wednesday, 19 September 2018 11:00 (2 hours)

Spherical Tokamak (ST) path to Fusion has been proposed in [1] and experiments on STs have demonstrated feasibility of this approach. Advances in High Temperature Superconductor technology [2] allows significant increase in the Toroidal field which was found to improve confinement in STs. The combination of the high beta, which has been achieved in STs [3], and high TF that can be produced by HTS TF magnets, opens a path to lower-volume fusion reactors, in accordance with the fusion power scaling proportional to beta^2 Bt^4 V. Feasibility of low-power compact ST reactor and physics and engineering challenges of the ST path to Fusion Power will be discussed.
High field spherical tokamak ST40 (R=0.4-0.6m, R/a=1.6-1.8, Ipl=2MA, Bt=3T, k=2.5, pulse ~ 1-10sec, 2MW NBI, DD and DT operations) is now operating. TF Cu magnet in ST40 will be LN2 cooled and research is on-going on development of full-HTS magnets. TF of 3T in an ST makes ST40 to have 3 times higher field than in any operational or upgraded STs and is an important step on the ST path to Fusion.
Details of engineering design, results of commissioning, of first experiments and experimental plans will be presented. Magnetic reconstruction and visible light image of the plasma obtained using merging-compression plasma formation, as used on START/MAST [4], are in good agreement. A target for NBI has been created. We will undertake experiments on ST40 to demonstrate performance of high field ST in burning plasma regimes to support designs of next step devices on the ST path to Fusion.

[1] R Stambaugh et al, Fus. Tech. 33 (1998) 1; [2] M Gryaznevich et al, Fus. Eng. & Design 88 (2013) 1593; [3] M Gryaznevich et al, Phys Rev Lett 50 (1998) 3972 [4] M Gryaznevich, A Sykes, NF 57 (2017) 072003.

Presenter: GRYAZNEVICH, Mikhail (ST40 Tokamak Energy Ltd)

Session Classification: P3