ICRF scenarios for ITER's half-field phase

E. Lerche[1], D. Van Eester[1], J. Ongena[1], M.-L. Mayoral[2], T. Johnson[3], T. Hellsten[3], R. Bilato[4], A. Czarnecka[5], R. Dumont[6], C. Giroud[2], P. Jacquet[2], V. Kiptily[2], A. Krasilnikov[7], M. Maslov[8], V. Vdovin[9] and JET, EFDA Contributors·

JET-EFDA, Culham Science Centre, Abingdon, OX14 3DB, UK

[1] LPP-ERM/KMS, Association Euratom-'Belgian State', TEC Partner, Brussels, Belgium; [2]Euratom-CCFE Fusion Association, Culham Science Centre, UK
[3] Fusion Plasma Physics, Association Euratom-VR, KTH, Stockholm, Sweden; [4] IPP(MPI)-Euratom Association, Garching, Germany
[5] Institute of Plasma Physics and Laser Microfusion, Warsaw, Poland; [6] CEA(IRFM)-Euratom Association, Saint-Paul-lez-Durance, France
[7] SRC RF Troitsk Institute for Innovating and Fusion Research, Troitsk, Russia; [8] Centre de Recherches en Physique des Plasmas, Association EURATOM-Conf. Suisse, Lausanne, CH; [9] RNC Kurchatov Institute, Nuclear Fusion Institute, Moscow, Russia

The non-active operation phase of ITER will be done in H and ^{4}He plasmas at half the nominal magnetic field, B_0=2.65T. At this field and for the given frequency range of the ICRF system (f=40-55MHz), three ICRF heating scenarios are available *a priori*: (i) Fundamental ICRH of majority H plasmas at f≈40MHz, (ii) second harmonic (N=2) ^{3}He ICRH in H plasmas at f≈53MHz and (iii) fundamental minority H heating in ^{4}He plasmas at f≈40MHz. While the latter is expected to perform well for not too large H concentrations, the heating scenarios available for the Hydrogen plasmas are less robust: The fundamental majority ICRH suffers from the unfavourable polarization of the RF fields near the ion cyclotron absorption region while the N=2 ^{3}He heating scheme requires large minority fractions to provide efficient bulk plasma heating. Recent JET experiments [1] performed in similar conditions to those expected in ITER's half-field phase confirmed the low performance of these two scenarios and numerical simulations [2,3] have shown that the situation is not much improved in ITER, mainly because of the rather modest plasma temperature and density expected in its initial operation phase. A summary of the main experimental results obtained at JET followed by numerical predictions for ITER's half-field ICRF heating scenarios will be presented.

[1] E.Lerche *et al.*, 37th EPS Conf. on Plasma Physics, Dublin (2010), ECA **34A**, O4.121
[2] E.Lerche *et al.*, *Proc. of* 23rd IAEA Fusion Energy Conference, Daejeon (2010)
[3] R. Budny *et al.*, submitted to *Nucl. Fusion*

· See the Appendix of F. Romanelli et al., paper OV/1-3, 23rd IAEA Fusion Energy Conference, Daejeon, 2010