A Study of Core Thomson Scattering Measurements in ITER Using a Multi-Laser Approach

G.S. Kurskiev[1], P.A. Sdvizhenskii[2], P. Andrew[3], M. Bassan[3], A.N. Bazhenov[1], I.M. Bukreev[1], P.V. Chernakov[1], M.M. Kochergin[1], A.B. Kukushkin[2,4], S.V. Masyukevich[1], E.E. Mukhin[1], A.G. Razdobarin[1], D.S. Samsonov[1], V.V. Semenov[1], S.Yu. Tolstyakov[1]

[1]Ioffe Physical Technical Institute, 194021, St. Petersburg, Russian Federation
[2]NRC "Kurchatov Institute", Moscow, 123182, Russian Federation
[3]ITER Organization, Route de Vinon-sur-Verdon, CS 90 046, 13067 St. Paul Lez Durance Cedex, France
[4]National Research Nuclear University MEPhI, Moscow, 115409, Russia

(i) The problem:

to measure ***T_e as high as 40 keV*** using ***Thomson Scattering*** in the reactor core ***both for Maxwellian and non-Maxwellian*** case of electron velocity distribution function especially in the case of unknown system spectral responsivity.

(ii) The suggested solutions:

to use IR probing ***laser 1320 n***m additionally to convenient NIR laser 1064 nm to improve measurement accuracy for T_e~ 40keV;

to use specific algorithm for TS data processing in case of non-Maxwellian eVDF;

to use multi-laser approach, that suggests plasma ***probing with 3 lasers – 946 nm/1064 nm/1320 nm simultaneously*** in the case of unknown system spectral sensitivity.

(iii) Next steps – test multi-laser approach and designed data procession technique in real experiment on existing fusion device.