Contribution ID: **9** Type: **Short Contributed Oral**

Towards large database analysis for reactors relevant studies on the high electron temperature measurement discrepancy

Thursday 4 September 2025 16:00 (15 minutes)

In tokamaks, measuring core electron temperatures becomes challenging at high values (typically >6–7 keV), where discrepancies often arise between diagnostics such as Thomson Scattering and ECE. Yet, accurate temperature measurements are critical for future reactors like ITER, CFETR or DEMO, where core Te is expected to be over 25 keV [1,2,3]. These discrepancies, evident in such high-Te scenarios, highlight not only a diagnostic issue but also an opportunity to deepen our understanding of core plasma physics, and recent studies have provided further insights, yielding more substantial results and clarifying additional aspects [4,5,6].
At the same time, the scientific community requires a larger experimental database to strengthen hypotheses developed in recent years. Data at relevant temperatures are becoming increasingly available as tokamak advancements progress toward reactor-scale conditions. Higher injected power (NBI, ECRH, CRH), longer plasma discharges, and improved diagnostics now enable the construction of an extensive database—more comprehensive than ever before—to investigate the discrepancy systematically using a standardized procedure [7].
To achieve this goal, the entire JET-DTE3 dataset is being analysed, with careful selection of relevant shots. Corrupted shots are excluded, and only discharges with consistent ECE and HRTS measurements are considered (Figure 1).
This contribution aims to provide some preliminary results obtained from the larger database, in the framework of the ITPA activity (ITPA JEX#17 on 'High Te measurements') born to compare data collected in different machines around the world, trying to find a full explanation of the discrepancy.

Author: SENNI, Luca (CNR-Istituto per le applicazioni del calcolo (IAC))

Co-authors: KAPPATOU, A. (Max-Planck-Institute fur Plasmaphysics , Boltzmannstr.2,85748 Garching, Germany); CHALLIS, C. (UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK); MAGGI, C. (UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK); FRIGIONE, D. (Department of Industrial Engineering, University of Roma 'Tor Vergata', via del Politecnico 1, Roma, Italy); KEELING, D. (UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK); KOS, D. (UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK); VAN EESTER, D. (Max-Planck-Institute fur Plasmaphysics , Boltzmannstr.2,85748 Garching, Germany); MAZON, Didier (CEA Cadarache); LERCHE, E. (Laboratory for Plasma Physics LPP-ERM/KMS, B-1000 Brussels, Belgium); GIOVANNOZZI, Edmondo (ENEA C.R. Frascati); ORSITTO, Francesco; GIRUZZI, Gerardo (CEA, IRFM, F-13108 Saint-Paul-lez-Durance, France); HORBIRK, J. (Max-Planck-Institute fur Plasmaphysics , Boltzmannstr.2,85748 Garching, Germany); MAILLOUX, J. (UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK); GARZOTTI, L. (UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK); MASLOV, M. (UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK); FONTANA, Matteo (Tokamak Energy Ltd, Milton Park, Oxfordshire OX14 4SD, United Kingdom f UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK); MAZZI, Samuele (CEA, IRFM, F-13108 Saint-Paul-lez-Durance, France); RIMINI, f. (UKAEA, Culham Campus, Abingdon, Oxfordshire, OX14 3DB, UK)

Presenter: SENNI, Luca (CNR-Istituto per le applicazioni del calcolo (IAC))

Track Classification: Fusion Technologies