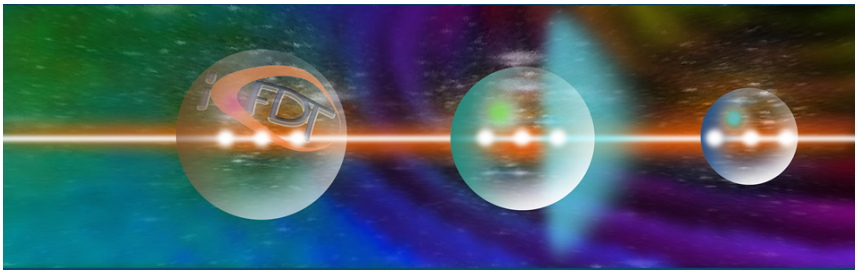

Contribution ID: **11** Type: **Poster**

Investigation of Near-Frequency Spectral Features by 140 GHz Wave Probing Using a Smart Scattering Setup

Thursday, 4 October 2018 14:30 (1h 30m)

A certain number of plasma parameters can be diagnosed with a technique implemented in the last decades in several tokamak devices, which exploits the detection of emissions due to Collective Thomson Scattering (CTS) of a probe radiation by plasma ion populations. Since the beginning, this diagnostic was mainly developed to locally measure the spectral power density which gives information either on the plasma bulk or on the fast ion dynamics by temporally resolved measurements. Also in ITER, a CTS system for fast ion detection, exploiting a 60 GHz probe beam, will be integrated for measurementsof the velocity distributions of confined fast alpha particles.
The possibility of using the same CTS setup, designed for measuring ion dynamics, to investigate also the occurrence of non-linear phenomena such as Parametric Decay Instabilities (PDIs) was demonstrated [1]. In particular, low-power thresholds of PDIs, as described by newly developed theoretical models [2], recently started to raise interest in the scientific community. The reason lies in the fact that emissions expected to be due to such processes could be detected with the microwave diagnostics of different devices with ECRH during standard CTS measurements and that, according to predictions, they have power thresholds of the same order of magnitude of the typical electron cyclotron power applied for heating and current drive in fusion plasmas. The CTS diagnostic installed on the FTU tokamak, operating at 140 GHz, has been upgraded during the last years [3]. The aim for such renovation is to allow observing both CTS thermal spectra (due the well known mechanism of a probe wave scattering off electron density fluctuations, governed by the collective behavior of particles) and PDI signals in the FTU scenarios, and investigate their possible effects on the injected gyrotron beam, which should be described by non-linear processes. The present status of this activity and the most recent improvements in the CTS diagnostic of FTU are described in this work.

Part of this work has been carried out within the framework of the EUROfusion Consortium and has received funding from the EURATOM research and training programmer 2014-2018 under grant agreement No 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission.

[1] E. Westerhof et al., Phys. Rev. Lett. 103 125001 (2009)
[2] E.Z. Gusakov and A.Y. Popov, Phys. Plasmas 25, 012101 (2018)
[3] W. Bin et al., Rev. Sci. Instrum. 87, 11E507 (2016)

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Session Classification: POSTER SESSION