Contribution ID: **3624** Type: **not specified**

P5.1084 Comparison of the ion heat transport properties of ASDEX Upgrade H-mode plasmas with theory-based transport models

Friday, 12 July 2019 14:00 (2 hours)

See the full abstract here http://ocs.ciemat.es/EPS2019ABS/pdf/P5.1084.pdf

Heat transport in tokamaks is widely believed to be dominated by turbulence associated with gradient-driven modes. As a consequence, temperature profiles tend to clamp to a critical logarithmic gradient, weakly reacting to additional heating. The extent of this so-called "profile stiffness" is, however, different depending on several plasma parameters, according to theory and to experimental observations in several tokamaks. Moreover, in a given plasma it's different for Ti and Te. Theory-based modelling is necessary to be able to interpret and order the experimental evidences, where it is often impossible to disentangle the effects of different plasma parameters: first, because they cannot always be scanned separately; secondly, they can affect both the stiffness and the critical gradient length. In this contribution, we consider a set of recent experiments in ASDEX Upgrade [1] where the ion heat transport properties have been investigated by using the on-axis and off-axis possibilities of the neutral beam injection system, applied in combination with two different levels of background electron cyclotron resonance heating. These well diagnosed experiments provide an excellent opportunity of validation for state-of-the-art transport models. We use two broadly used quasi-linear transport models, TGLF-SAT1 and QuaLiKiz, to predict the experimental profiles with varying Te/Ti. The RABBIT code, newly implemented in ASTRA, allows to have a fast, yet accurate and energy-resolved reconstruction of the fast-ion distribution function in presence of Neutral Beam Injection. This also enables us to test the impact on the predictions when the fast-ion population in ASTRA is evolved self-consistently with the modelled profiles. The quasi-linear effects of fast-ion stabilization of turbulence beyond dilution are then compared to those predicted with gyrokinetic linear and non-linear simulations.

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Session Classification: Poster P5