Reply to referees’ comments on EC21 Paper

"Database study of turbulent electron temperature fluctuation measurements at ASDEX Upgrade"

The authors are very grateful to the referees for their careful reading and insightful comments on this paper. The paper and discussion have been improved thanks to the referees’ suggestions. In the following table, the authors respond to the referees’ comments. Changes made to the manuscript are indicated in red.

Referee 1

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| # | Referee's Comment | Authors' Answer |
| 1.1 | This is an interesting, well written paper of limited but well defined scope. | Thank you for this comment. The authors look forward to building upon this study in follow-on works that feature physics-based analysis of the experimental turbulence database constructed using the methods detailed in the current work. |
| 1.2 | The author may wish to think about whether only those channels in cut-off should be excluded or channels which are within some percentage of the cutoff frequency to avoid refraction effects disrupting the interpretation. | Thank you for this insightful comment. The authors recognize the importance of making CECE measurements far from cutoff and have updated the implementation of the automated analysis and revised the paper to take this better into account. While the implementation of the automated analysis detailed in this paper did include a fixed 5 GHz conservative buffer above the right-hand cutoff frequency, the 5 GHz buffer was an estimate, it was not percentage-based, and in any case this point was not communicated in the previous version of the paper.  The authors have made the following changes to the text in section 2.2. The sentence “CECE channels that are not cutoff, as shown in Figure 3, are included for further analysis while those channels that are cutoff are removed from the analysis process.” has been replaced by: Additionally, the analysis identifies CECE channels that have corresponding second harmonic electron cyclotron frequencies that are less than 105.5% of the respective right-hand cutoff frequencies. This 105.5% frequency threshold is more conservative as a limit than the right-hand cutoff frequency and indicates the level below which refraction has a non-negligible effect on ECE measurements. This limit corresponds to an equivalent threshold, determined based on ray tracing studies, which requires that the local electron density be less than 85% of the cutoff density in order for refraction to have a negligible effect on ECE measurements [19-21]. CECE channels whose second harmonic electron cyclotron frequencies are greater than this limit, as shown in Figure 3, are included for further analysis while those channels with lower frequencies are removed from the analysis process.  References 19-21 were added to the References section.  Reference 19 is as follows:  A.E. White, P. Phillips, D.G. Whyte, A.E. Hubbard, C. Sung, J.W. Hughes, A. Dominguez, J. Terry, I. Cziegler, Nucl. Fusion **51**, 113005 (2011)  Reference 20 is as follows:  A.E. White, L. Schmitz, W.A. Peebles, T.A. Carter, T.L. Rhodes. E.J. Doyle, P.A. Gourdain, J.C. Hillesheim, G. Wang, C. Holland, G.R. Tynan, M.E. Austin, G.R. McKee, M.W. Shafer, K.H. Burrell, J. Candy, J.C. DeBoo, R. Prater, G.M. Staebler, R.E. Waltz, M.A. Makowski, Rev. Sci. Instrum. **79**, 103505 (2008)  Reference 21 is as follows:  A.G. Lynn, P.E. Phillips, A. Hubbard, Rev. Sci. Instrum. **75**, 10 (2004)  Figure 3 was updated to show the 105.5% frequency limit. The minimum of the y-axis was also updated to be 0 GHz.  The caption below Figure 3 in section 2.2 was updated from “CECE measurement locations (highlighted region) are not cutoff if the second harmonic electron cyclotron frequency is above the right-hand cutoff frequency. CECE channels measuring at cutoff locations are identified and removed from further analysis. This minimizes the effects of refraction on data processed by the analysis method.” to the following:  CECE measurement locations (highlighted region) are not cutoff if the second harmonic electron cyclotron frequency (solid green curve) is above the right-hand cutoff frequency (solid red curve). Additionally, the effects of refraction on data processed by the automated analysis are minimized by identifying and removing from further analysis any CECE channels that have second harmonic electron cyclotron frequencies below a 105.5% multiple of the right-hand cutoff frequency (dashed red curve) [19-21].  Upon applying this updated limit to the current iteration of the database, 235 datapoints were identified that were in violation of this updated limit. The number of datapoints in the database as detailed in Section 3.2 has been updated accordingly, as per the following paragraph (note also that the range of discharge numbers included in the database was also added to this paragraph for better reproducibility of this work):  The first iteration of the database was developed by running the automated analysis method on 700 discharges measured by the CECE system installed on AUG Sector 9 from May 2020 to January 2021. Among the 700 discharges (including AUG discharge numbers 37,700 - 38,399), 166 of them contained data that passed the checks of the automated analysis. Through the analysis of the 166 discharges, 4,286 datapoints were written to the database. Of this number, 3,936 datapoints were located in the core (defined here as corresponding to ρtor < 0.8, where ρtor is the square root of the normalized toroidal magnetic flux) of the AUG plasmas. |
| 1.3 | The citation for the CECE system is incorrect and read [1], when it should be [3]. | Thank you for catching this mistake on page 2. This has been corrected. |