Reply to Referee report

ECH and ECCD modelling studies for DTT
B. Baiocchi et al.

We thank the referee for the very careful reading and for the detailed comments and suggestions. In the following we reply to his/her questions. The sentences/words added or modified in the text are written with red color.

1) In the abstract, the sentence "compatibility between the EC system and the pellet injection system is verified" should be formulated in a more explicit way (presently, the meaning becomes clear just at the end of Sec. 1).

The suggestion of the referee has been followed, and the following sentence has been added in the abstract:
"the density variations due to pellet injection are foreseen to negligibly influence the EC performances, allowing the EC beams to reach the plasma central region for bulk heating and to drive current on the rational surfaces for NTM mitigation."

2) In the Introduction, the expression "two types of launcher" should be explained. I assume the authors refer here to the upper and equatorial launcher.
The assumption of the referee is correct, and the following sentence has been added in the text:
"two different antennas are foreseen to be hosted in the equatorial and in the upper port of each ECRH sector, with 6 and 2 single launchers respectively. The 8 launchers of a cluster are independently steerable to improve the flexibility, allowing EC absorption over a broad range of plasma locations."

3) At the end of the first column of p. 1, besides toroidal field and plasma current, it would be useful to add also major and minor radius of the plasma. Later on, when the high density ($2.5e20$ m^{-3}) is quoted, I would suggest adding also the corresponding plasma frequency (ca. 142 GHz) to give the feeling of the envisaged distance of the EC heating frequency (170 GHz) from cutoff, which is relevant also for the discussion in Sec. 3.

The text has been modified following the suggestion of the referee.

4) Optional: In Fig. 2, the color bar ranges from -40 to 40 kA/MW, while the maximum achievable current is of the order of ca. 25 kA/MW. This is at first glance a bit confusing and a more appropriate range for the color bar could be selected. Moreover, the effective charge Z_{eff} is difficult to read from Fig. 1 and could be specified also in the text or in the caption.

The graphs of fig. 2 have been modified, and a color bar interval of [-30,30] kA/MW has been used. The fig. 1-left has been improved and the average value of Z_{eff} has been written in the relative caption.

5) On p. 2 it is stated that "Core heating and CD are well performed by equatorial launchers, then allowing the accomplishment of the tasks of bulk heating, profile tailoring and sawteeth instabilities stabilization". However, it is not clear what the corresponding requirements in terms of deposited power and driven current are. Could they be specified or quoted from some reference, in order to substantiate this claim?

Because quantitative studies regarding the requirements for EC to achieve the tasks of profile tailoring and sawteeth instabilities stabilization are still in progress on the most recent full power DTT Scenario, the following sentences have been added in the text, and a very recent work presented at EPS conference 2022 has been quoted as reference:

"Such results are promising also in order to achieve the additional tasks of profile tailoring and sawteeth instabilities stabilization. Very recently, theoretical studies and integrate modelling works have been started to perform a detailed analysis of the quantitative requirements for EC to fulfill such tasks in the most recent reference full power DTT scenario [6]."

6. I. Casiraghi *et al*, 48th EPS Conference on Plasma Physics (Virtual Edition, June 27-July 1 2022), O2.108

6) If I understand correctly the discussion in Sec. 3, the density variations due to pellet injection that might make the outer part of the plasma not reachable for the EC beams (s. Fig. 4) are actually much larger than what the simulations with HPI2 predict (max. $\delta n_{e,max}$ around 7e19 m^{-3}) and so not really relevant for realistic DTT scenarios. If this is the case, a corresponding comment should be added either in the text or in the caption of Fig. 4.

The suggestion of the referee has been followed, and the following sentences have been added in the text:

"The density variations due to pellet injection as predicted by HPI2 are then highly lower with respect to the values which prevent the EC beams reaching the outer plasma region (see Fig. 4). Such perturbations are then foreseen not really problematic for EC performances in realistic DTT scenarios."

7) In the comments concerning the adjustment of steering angle and polarization (end of Sec. 3 and Sec. 4), it should be stated explicitly that a "real-time" adjustment during the plasma discharge and not between two consecutive discharges is meant (again, if I understood correctly...).

The suggestion of the referee has been followed, and two sentences (Sec 3 and 4) have been modified as follows:
Sec 3: "We can conclude that, for realistic pellet sizes, the 'real-time' corrections of the steering angles during the plasma discharge, if needed, are of the order of the degree."
Sec 4: "The angles steering, which could be needed during the plasma discharge for the achievement of the operational tasks, can have a not negligible effect on the ellipticity and the ellipse inclination, requiring to consequently adjust the injected wave polarization."

8) Some typos and suggestions for improving the English formulation: In the abstract: "the more recent" should be "the most recent". Throughout the paper, the word "achieve" should be replaced by "reach" when referring to e.g. "reaching a given position" in the plasma. In Sec. 3, δn_{emax} should be $\delta n_{e,max}$. In the Summary, "corresponding to" sounds better than "correspondent to". Please check the capitalization of the first word in the captions.

The text has been modified following the suggestion of the referee.