This manuscript presents updated state-of-the-art predictions for $b\bar{b}H$ production at 13.6 TeV, including new inclusive and differential results at fixed order and after matching with parton showering. In particular, these predictions bring 4FS and 5FS results into full agreement for the first time, substantially reducing theoretical uncertainties and improving the modelling relevant for Higgs and di-Higgs analyses. Implications for light-quark Yukawa studies and BSM physics are also explored.

This work constitutes an important contribution to the activities of the LHC Higgs Working Group and should be published within the Yellow Report 5. I nevertheless encourage the authors to consider the minor comments below, which could help clarify a few points.

1. Many abbreviations are used throughout the manuscript without definition. While many of them are standard, it is good practice to define all abbreviations at first use. I would also recommend avoiding the use of abbreviations in the abstract whenever possible, to facilitate readability.

2. For a reader not working on this topic, the last diagram in Figure 1 ($b\bar{b} \to H$) may be confusing since no bottom quarks appear in the final state. Although this point is discussed later in the introduction, it is not stated in a short and explicit way. It would therefore be helpful to extend the caption of Figure 1 or the first paragraph of the introduction by one or two sentences, clearly stating that the authors are computing inclusive cross sections for Higgs production via bottom fusion in the two flavour-number schemes.

3. On page 3, it is stated that in the 2HDM or the MSSM, $v_{1,2}$ are the vevs of the CP-even Higgs fields. Strictly speaking, this is not accurate because $v_{1,2}$ are the vevs of the neutral components of the two Higgs doublets, which are gauge eigenstates. The CP-even Higgs fields are instead mass eigenstates that one obtains after rotating the neutral components into the mass basis.

4. I believe that a word is missing in the last sentence of page 4: '*For heavy Higgs bosons in BSM scenarios with an enhanced bottom-Yukawa coupling, however, the radiation off bottom quarks is the dominant contribution, while all top-quark Yukawa induced become subleading.*'. This should read '*[...] all top-quark Yukawa induced ones become subleading.*'

5. A reference to LHAPDF may be in order in section 2. A reference to Pythia 8 should be added when mentioned for the first time in Section 5.1.2 (instead of Section 6.1).

6. In Section 2.1, I am somewhat surprised by the use of $\alpha \simeq 1/132$. Wouldn't the value of α at the Z pole be more appropriate for LHC Higgs-production predictions? Could the authors comment on the motivation for this choice?

7. In their calculation of scale uncertainties, the authors vary both the scale entering the running of the strong coupling and the scale entering the running of the bottom Yukawa. Would it be possible to include a comment on the breakdown of the relative contributions of these two sources to the total scale uncertainty, extending the discussion in Section 2.3?

8. On page 13, the authors provide a brief discussion of the choice of the jet resolution variable inherent to the Geneva method after Eq. (5.5). This is interesting, and it would be helpful to include some concluding remarks or a summary of the impact of different choices on the results.

9. On page 14, there is an extra period after the reference to Footnote 4. Furthermore, for completeness, the authors should define the MiNNLO$_{\rm PS}$ damping parameter p explicitly instead of referring the reader to [76].

10. From the discussion in Section 5.1.2, it appears that cumulant scale choices in Geneva lead to very large uncertainties. If so, it would be helpful to provide a clear recommendation on whether it should be used for practical predictions. Furthermore, it is difficult to understand the emphasis on this choice in the results, and it would be useful to clarify why the spectrum scale choice is not given more focus.

11. On page 18, I think that '*[...] but deviates from it at higher corrections*' should be '*[...] but deviates from it at higher orders*'. On the same page, the sentence '*Loop effects from SM particles, primarily the top quark, and from SUSY states modify the bottom Yukawa coupling, with these contributions resummed to all orders, which are* $\tan\beta$*-enhanced.*' is grammatically unclear and potentially misleading. It should be clarified. Finally, still on the same page, why calling the 5FS the massless scheme?

12. A clarification on Eqs. (5.7) and (5.8) would be helpful. Strictly speaking, the single-Higgs production cross section refers to a 125 GeV Higgs. Therefore, the comment on the mass dependence should be moved from Footnote 5 to the main text.

13. The numerical values used for the M_h^{125} benchmark ($m_A = 1.4$ TeV and $\tan\beta = 20$) presumably follow from some analysis from which the authors note that this scenario is not excluded. A supporting reference probably exists, and should thus be provided.

14. It would be helpful if the authors could comment on the origin of the difference between the NNLO impact on the rapidity distribution shown in Figure 7 and the corresponding result in the SM.

15. One page 22, the sentence '*The NNLO calculation is thus complete in full colour, up to power-suppressed in the bottom-quark mass, which are neglected only in the two-loop amplitude.*' seems incomplete. Shouldn't it better to write '*The NNLO calculation is thus complete in full colour, up to power-suppressed terms in the bottom-quark mass which are neglected only in the two-loop amplitude.*'?

16. I do not understand the reason for using a 9-point scale variation in Section 6.1, while a 7-point variation is employed throughout the rest of the manuscript (for a good reason stated in Section 2.3). Could the authors provide a justification for this choice, for example by extending Footnote 9 and including it in the main text?

17. On page 29, there is a 'bbH' occurrence that should be written as '$b\bar{b}H$' for consistency with the rest of the document.