

Higgs data does not rule out a sequential fourth generation

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Contrary to common perception, we show that the current Higgs data does not eliminate the possibility of a sequential fourth generation that get their masses through the same Higgs mechanism as the first three generations. The inability to fix the sign of the bottom-quark Yukawa coupling from the available data plays a crucial role in accommodating a chiral fourth generation which is consistent with the bounds on the Higgs signal strengths. We show that effects of such a fourth generation can remain completely hidden not only in the production of the Higgs boson through gluon fusion but also to its subsequent decay to $\gamma\gamma$ and $Z\gamma$. This, however, is feasible only if the scalar sector of the standard model is extended. We also provide a practical example illustrating how our general prescription can be embedded in a realistic model.

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