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[Cancelled] Searching for a Heavy Neutral CP-Even Higgs Boson in the BLSSM at the LHC Run 3 and HL-LHC

The detection of a heavy neutral CP-even Higgs boson of the $B-L$ Supersymmetric Standard Model (BLSSM), h' , with $m_{h'} \simeq 400$ GeV, at the Large Hadron Collider (LHC) for a center-of-mass energy of $\sqrt{s} = 14$ TeV, is investigated. The following production and decay channels are considered: $gg \rightarrow h' \rightarrow ZZ \rightarrow 4\ell$ and $gg \rightarrow h' \rightarrow W^+W^- \rightarrow 2\ell + MET$ (with MET being the Missing Transverse Energy), where $\ell = e, \mu$, with integrated luminosity $L_{\text{int}} = 300 \text{ fb}^{-1}$ (Run 3). Furthermore, we also look into the di-Higgs channel $gg \rightarrow h' \rightarrow hh \rightarrow b\bar{b}\gamma\gamma$ at the High-Luminosity LHC (HL-LHC) with an integrated luminosity of $L_{\text{int}} = 3000 \text{ fb}^{-1}$. We demonstrate that promising signals with high statistical significance can be obtained through the three aforementioned channels.

Authors: Mr ASHRY, Mustafa (Department of Mathematics, Faculty of Science, Cairo University, Giza 12613, Egypt); Prof. KHALIL, Shaaban (Center for Fundamental Physics, Zewail City of Science and Technology); Prof. MORETTI, Stefano (School of Physics and Astronomy, University of Southampton)

Presenter: Mr ASHRY, Mustafa (Department of Mathematics, Faculty of Science, Cairo University, Giza 12613, Egypt)

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