ID de Contribution: **67**   Type: **Non spécifié**

Search for a new resonance decaying to a scalar and a Higgs boson in the final state with two bottom quarks and two photons in proton-proton collisions at $\sqrt{s} = 13$ TeV

mardi 24 octobre 2023 17:00 (30 minutes)

A search for the resonant production of a heavy scalar X decaying into a Higgs boson and a new lighter scalar S, through the process X→ S ($b\bar{b}$) H($\gamma\gamma$), where the two photons are consistent with the Higgs boson decay, is performed. The search is conducted using 140 fb^{-1} of LHC Run 2 data recorded by ATLAS. The mass space investigated in the analysis is $170 \leq mX \leq 1000$ GeV and $15 \leq mS \leq 500$ GeV. Parameterised Neural Networks (PNN) are used to enhance the signal purity and to achieve continuous sensitivity in a domain of the (mX, mS) mass plane.

A log-likelihood fit is performed on the PNN score distribution to look for an excess with respect to expected background compatible with X→ S ($b\bar{b}$) H($\gamma\gamma$) signal.

If no excess is found, model independent upper limits will be set on the cross section times branching ratio.

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Classification de Session: Beyond Standard Model

Classification de thématique: Beyond Standard Model