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What can 3ℓ signatures at the LHC can tell us about additional bosons?

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As pointed out in a number of works, the LHC is displaying a number of anomalies in the production of multiple leptons in proton-proton collisions. A simplified model where a scalar, H, with a mass around the EW scale that decays predominantly to Sh, where S is a EW singlet and h is the Higgs boson in the Standard Model (SM), seems to do a reasonable job in capturing these anomalies. In this work we focus on the production of three isolated leptons (e and μ) studied by the ATLAS and CMS collaborations in the context of the production of ZW. There is it noted that the description of the transverse mass of the charged lepton and the missing transverse energy with the simplified ansatz made above is not satisfactory. In Ref. arXiv:1809.06344 the hypothesis of $A \to ZH \to ZSh$ (A is a CP-odd boson in a 2HDSM+S model) was tested and compared to the data. Similar studies are performed here using the three lepton final state.

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