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Search for new physics using events with two same-sign isolated leptons in the final state

Although same sign dileptons final states are very rare in the SM context, they appear naturally in many different new physics scenarios such as SUSY where two same-sign dileptons can be produced in the decay chain of supersymmetric particles.

Different scenarios can be presented: Same-sign dileptons accompanied by b-quarks can arise from SUSY processes where 3rd generation quark superpartners are lighter than other squarks, resulting in an abundance of top and bottom quarks produced in the cascade decays. In general, same-sign dileptons can be particularly sensitive to SUSY models with compressed spectra where the mass of the LSP is very close to the mass of the produced supersymmetric particle, either if it is produced via strong production (squarks or gluinos) when it is accompanied with high hadronic activity or if it is produced via ewk production (charginos or neutralinos) when almost no hadronic activity is present. In all cases the SUSY decay chain ends with the LSP, that escapes undetected and therefore contribute strongly to the MET of the event.

We therefore search for SUSY using same sign dilepton events with/out hadronic activity and large missing ET, using the full 2012 integrated luminosity and we interpret our results in the context of various SUSY models.

Authors: DUNSER, Marc (Eidgenoessische Tech. Hochschule Zuerich (CH)); FOLGUERAS, Santiago (Universidad de Oviedo (ES))

Presenter: DUNSER, Marc (Eidgenoessische Tech. Hochschule Zuerich (CH))

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