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## Update on the multi-lepton anomalies and scalar candidates at the LHC

*Friday, 7 July 2023 11:00 (20 minutes)*

In this presentation we give an update of the multi-lepton (electrons and muons) anomalies at the LHC is given. These include the excess production of opposite sign leptons with and without b- quarks, including a corner of the phase-space with a full hadronic jet veto; same sign leptons with and without b-quarks; three leptons with and without b-quarks, including also the presence of a Z. The internal consistency of these anomalies and their interpretation in the framework of a simplified model are presented, where the inconsistency of the data with the SM is more than  $8\sigma$ . The simplified model includes a singlet scalar S with a mass in the range 130-170 GeV produced from the decay of a heavier new scalar H, leading to di-boson signatures. Motivated by this, a search for narrow resonances with  $S \rightarrow \gamma\gamma$ ,  $Z\gamma$  in association with light jets, b-jets or missing transverse energy is performed. A narrow excess is found at 151.5 GeV with a global significance exceeding 5 sigma, including recent results from the LHC experiments. The connection with the 96 GeV candidate is also discussed.

### Apply to be considered for a student ; award (Yes / No)?

No

### Level for award;(Hons, MSc, PhD, N/A)?

N/A

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