PROCEEDINGS OF SCIENCE

Search for high-mass resonances decaying into dilepton final state at 13 TeV with CMS

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A search for new high-mass resonances decaying into electron or muon pairs is performed using the full dataset obtained from proton-proton collisions at 13 TeV. The search exploits data collected by the CMS experiment in 2016, corresponding to an integrated luminosity of 36 fb^{-1}. No significant deviations are observed from the standard model expectation. Upper limits on the product of a new resonance production cross section and branching fraction to dileptons are calculated in a model-independent manner. A lower mass limit is set at 95% confidence level for new spin-1 resonance arising in the sequential standard model and grand unified theory models, and spin-2 Kaluza-Klein graviton arising in the Randall-Sundrum model of extra dimensions.

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1. Introduction, event selection, and results

Neutral resonances decaying to lepton pairs are predicted in a variety of theoretical models beyond the standard model (SM). Commonly considered models are the sequential standard model and the grand unified theory models containing the spin-1 Z'_{SSM} and Z'_{ψ} boson respectively, and Randall-Sundrum model of extra dimensions containing the spin-2 G_{KK}.

Electron (muon) candidates are required to have a transverse momentum p_{T} >35 (53) GeV, be within geometrical acceptance, pass high-energy (momentum) identification, and pass isolation requirements. Figure 1 shows the comparison of dilepton invariant mass spectra between data and SM background prediction after the selection for the two channels.

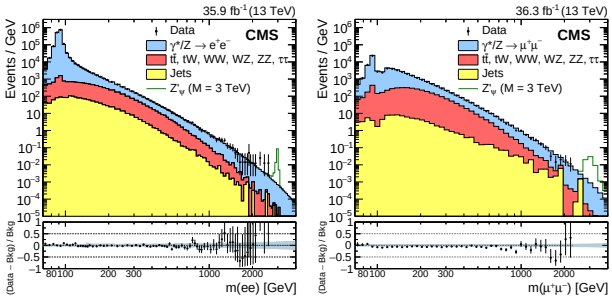

Figure 1: The invariant mass spectra of dielectron (left) and dimuon (right) events.

No significant deviations are observed. The limits are set on the ratio of the cross section for Z' boson to cross section for the SM Z boson. The expected and observed limits for spin-1 and spin-2 resonances are shown in Figure 2. We obtain 95% CL lower mass limits of 4.50 and 3.90 TeV for Z'_{SSM} and Z'_{ψ}, respectively; and 2.10, 3.65, and 4.25 TeV for G_{KK} with coupling parameter $k/\overline{M}_{\mathrm{Pl}}$ of 0.01, 0.05, and 0.10, respectively. All the results are based on [1].

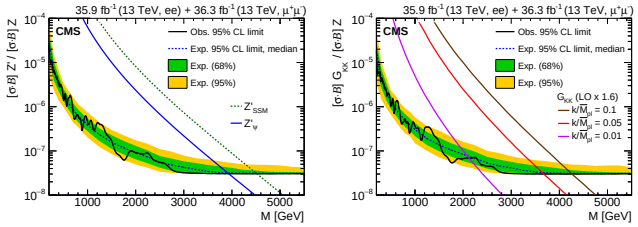

Figure 2: The upper limits at 95% CL on the product of production cross section and branching fraction for a spin-1 (left) and spin-2 resonance (right).

Acknowledgments

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References

[1] The CMS collaboration, *Search for high-mass resonances in dilepton final states in proton-proton collisions at* $\sqrt{s} = 13$ *TeV*, JHEP **06** (2018) 120