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A model independent search for new phenomena with the ATLAS detector in pp collisions at $\sqrt{s}=8\text{TeV}$

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The data recorded by the ATLAS experiment have been thoroughly analyzed for specific signals of physics beyond the Standard Model (SM); although these searches cover a wide variety of possible event topologies, they are not exhaustive. Events produced by new interactions or new particles might still be hidden in the data. The analysis presented here extends specific searches with a model-independent approach. All event topologies involving electrons, photons, muons, jets, b-jets and missing transverse momentum are investigated in a single analysis. The SM expectation is taken from Monte Carlo simulation. For the 697 topologies with a SM expectation greater than 0.1 events three kinematic distributions sensitive to contributions from new physics are scanned for deviations from the SM prediction. A statistical search algorithm looks for the region of largest deviation between data and the SM prediction, taking into account systematic uncertainties. To quantify the compatibility of the data with the SM prediction, the distribution of p-values of the observed deviations is compared to an expectation obtained from pseudo-experiments that includes statistical and systematic uncertainties and their correlation between search channels. No significant deviation is found in data. The number and size of the observed deviations follow the Standard Model expectation obtained from the simulated pseudo-experiments

Summary

The data recorded by the ATLAS experiment have been thoroughly analyzed for specific signals of physics beyond the Standard Model; although these searches cover a wide variety of possible event topologies, they are not exhaustive. Events produced by new interactions or new particles might still be hidden in the data. The analysis presented here extends specific searches with a model-independent approach. All event topologies involving electrons, photons, muons, jets, b-jets and missing transverse momentum are investigated in a single analysis, and about 700 final states are considered. The SM expectation is taken from Monte Carlo simulation. No significant deviation is found in data and the number and size of the observed deviations follow the Standard Model expectation obtained from the simulated pseudo-experiments.

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