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Evidence for four-top-quarks production with the ATLAS detector at the Large Hadron Collider

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Results are presented of searches in ATLAS for four-top-quark production. This rare process, with a predicted cross section of 12 fb in the Standard Model, has not been observed yet by experiment. The analysis is based on data from proton–proton collisions at a centre-of-mass energy of 13 TeV collected with the ATLAS detector during run 2 of the CERN Large Hadron Collider, and corresponding to an integrated luminosity of 139 inverse fb. The search is performed in several final states, either with multiple or same-sign leptons or with one or two leptons and a large jet and b-jet multiplicity. Background models are carefully constructed and validated, for top quark pair production with additional gauge bosons and (b-)jets and other background processes. The signal strength is extracted with a fit to distributions of several sensitive observables. The combination of the searches yields 4.7 sigma evidence for four-top-quark production.

Collaboration / Activity

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