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Evidence for the production of three massive vector bosons with the ATLAS detector

A search for the production of three massive vector bosons in pp collisions is performed using data at $\sqrt{s} = 13$ TeV recorded with the ATLAS detector at the Large Hadron Collider in the years 2015–2017, corresponding to an integrated luminosity of 79.8 fb^{-1}. Events with two same-sign leptons ℓ (electrons or muons) and at least two reconstructed jets are selected to search for $WWW \to \ell\nu\ell\nu qq$. Events with three leptons without any same-flavour opposite-sign lepton pairs are used to search for $WWW \to \ell\nu\ell\nu\ell\nu$, while events with three leptons and at least one such lepton pair and one or more reconstructed jets are used to search for $WWZ \to \ell\nu qq\ell\ell$. Finally, events with four leptons are analysed to search for $WWZ \to \ell\nu\ell\nu\ell\ell$ and $WZZ \to qq\ell\ell\ell\ell$. Evidence for the joint production of three massive vector bosons in pp collisions is observed with a significance of 4.0 standard deviations, where the expectation is 3.1.

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