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Measurement of the Spin and Parity of the Higgs Boson with $H \to ZZ^* \to 4l$ Decay Channel Using the ATLAS Detector NAN LU, University of Michigan, ATLAS COLLABORATION — Measurement of the spin and parity properties of the Higgs boson by the ZZ* decay channel with the ATLAS experiment will be presented. A spin-parity discriminant, boosted decision tree (BDT), is developed to distinguish between different spin-parity states. In addition, a second BDT discriminant is developed to separate Higgs signal and the background from the SM ZZ events. The determination of the spin-parity is obtained by fitting data with 2-dimensional PDF (the probability density function) based on these two BDT outputs. Sensitive discriminate variables are selected for BDT training, and BDT outputs. The spin and parity of the Higgs boson is found to be consistent with the SM predictions.

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