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Signal optimization for a $W' \rightarrow t\bar{b}$ search in proton-proton collisions at 7 TeV with the ATLAS detector HO LING LI, The University of Chicago, ATLAS COLLABORATION — Many theories beyond the Standard Model, e.g. extra-dimension model, technicolor theory and little higgs theory, predict the existence of W' boson. Here, we present the search of W' production in single top channel using the LHC pp collision data collected with the ATLAS detector at a center-of-mass energy of 7 TeV. The top quark decays via $t \rightarrow Wb$ with only the semileptonic decay channel being considered, thus $W' \rightarrow t\bar{b} \rightarrow l\nu b\bar{b}$. In this case, the W' signal appears in the detector as two jets from b-quarks, a lepton and missing transverse energy from a neutrino. In order to distinguish this process from the background contribution that mainly consists of multijets, W+jets and top quark pair events, with smaller contributions from Z+jets, single top and diboson events, additional variables are applied to optimize the W' signal. A fitting method using the invariant mass distribution of the final state particles has been used to set limits on the $W' \rightarrow t\bar{b}$ cross section times branching ratio as a function of the W' mass.

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