

論文の内容の要旨

Search for heavy diboson resonances decaying into semi-leptonic final states in 139 fb^{-1} of $\sqrt{s} = 13 \text{ TeV}$ pp collisions with the ATLAS detector

(ATLAS測定器において収集した重心系エネルギー13 TeVの陽子陽子衝突データ 139 fb^{-1} を使った、セミレプトニック終状態を持つ弱ボソン共鳴の探索)

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This thesis represents searches for heavy new resonances decaying into dibosons (WW, WZ and ZZ) in semi-leptonic final states (vvqq, lvqq and llqq) using proton-proton collision data at a center-of-mass energy of $\sqrt{s} = 13 \text{ TeV}$. The data, corresponding to an integrated luminosity of 139 fb^{-1} , were recorded with the ATLAS detector between years 2015 and 2018 at the Large Hadron Collider. The searches are performed in final states in which one vector boson decays leptonically (a pair of electrons or muons, a pair of neutrinos, and a pair of an electron (muon) and a neutrino), and the associated W boson or the other Z boson decays hadronically. Several new ideas are introduced to improve the sensitivity e.g. Track-CaloCluster (TCC), which is particle-flow algorithm to achieve better jet substructure performance for high- p_T jet, Variable-radius (VR) track-jet b-tagging for the boosted $Z \rightarrow b\bar{b}$ reconstruction, machine learning (ML) based analysis, and so on. No evidence for the production of heavy resonances is observed. Upper bounds on the production cross sections of heavy resonances times their decay branching ratios to WW, WZ and ZZ are derived in the mass range from 300 to 5000 GeV, within the context of Standard Model extensions with a heavy vector triplet or warped extra dimensions. Production processes of gluon-gluon-fusion, Drell-Yan or vector-boson-fusion are considered, depending on the assumed model.