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Searching for New Physics at the LHC in t tbar production in the all-hadronic decay mode using top quark tagging YIU CHEUNG, State University At Buffalo — Many new physics models predict resonances with masses in the TeV range which decay into a pair of top quarks. With its large cross section, $t\bar{t}$ production at the Large Hadron Collider (LHC) offers an excellent opportunity to search for such particles. We present a detailed study of the discovery potential of the CERN Large Hadron Collider, operating at its design energy of $\sqrt{s} = 14$ TeV, for Kaluza-Klein (KK) excitations of the gluon in bulk Randall-Sundrum (RS) models in $t\bar{t}$ production where both top quarks decay hadronically and are identified via top-tagging. Our calculations take into account the finite resolution of detectors, the anticipated top-tagging efficiency and light jet misidentification probability, and include the dominant di-jet background. We derive semi-realistic 5σ discovery limits for nine different KK gluon scenarios. We also analyze the capabilities of the LHC experiments to differentiate between individual KK gluon models. We find that, for the projected top-tagging efficiencies and light jet misidentification probabilities, and for the parameters and models chosen, KK gluons with masses up to about 4 TeV can be discovered at the LHC or a luminosity upgraded LHC. The ability of the LHC to discriminate between different bulk RS models, and to measure the couplings of the KK gluons is found to be highly model dependent.

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