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Charge asymmetries of top quarks: a window to new physics at hadron colliders.

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Several models predict the existence of heavy colored resonances decaying to top quarks in the TeV energy range that might be discovered at the LHC. In some of those models, moreover, a sizable charge asymmetry of top versus antitop quarks might be generated. The detection of these exotic resonances, however, requires selecting data samples where the top and the antitop quarks are highly boosted, which is experimentally very challenging. We assess that the measurement of the top quark charge asymmetry at the LHC is very sensitive to the existence of excited states of the gluon with axial-vector couplings to quarks. We use a toy model with general flavour independent couplings, and show that a signal can be detected with relatively not too energetic top and antitop quarks. We also compare the results with the asymmetry predicted by QCD, and show that its highest statistical significance is achieved with data samples of top-antitop quark pairs of low invariant masses.

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