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Top quark physics and search for physics beyond the Standard Model at the Large Hadron Collider

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A measurement of the production cross section of the top quark pair decay with a tau lepton in the final state that is carried out in the 13TeV proton-proton collisions data collected with the Compact Muon Solenoid detector at Large Hadron Collider. The ratio to the cross section in the light dilepton final states and the partial width of the top quark decay to tau lepton are also estimated. The top quark pairs provide access to high energy states in Standard Model and possible interactions with Beyond Standard Model particles. In particular, the symmetry of the decay chain is convenient in the study of W boson decay, including the case with a tau in the final state. The ratio between branching ratios of the lepton plus tau and of dilepton final states is studied as a possible test of Lepton Universality in Standard Model.

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