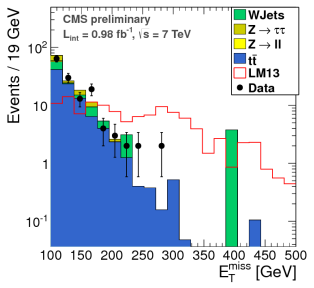
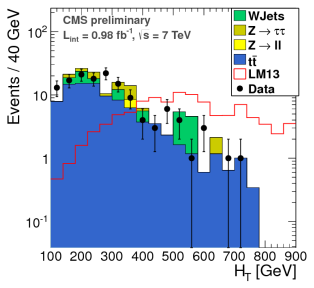
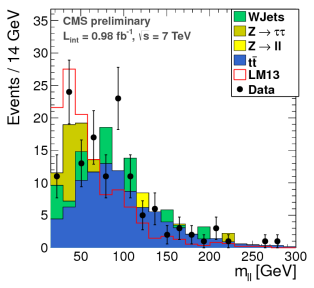
Table of Contents

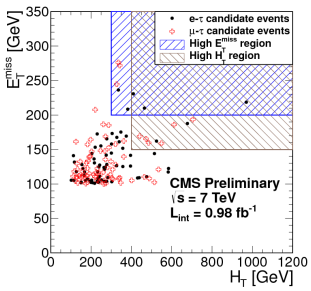
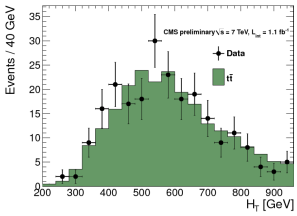
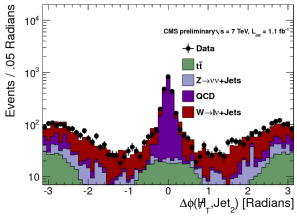
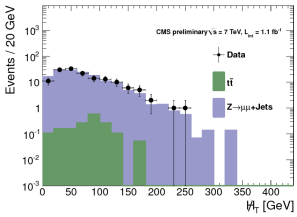
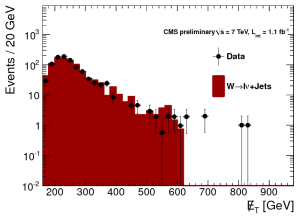
Search for Physics Beyond the Standard Model in Events with Opposite-sign Tau Pairs and Missing Energy

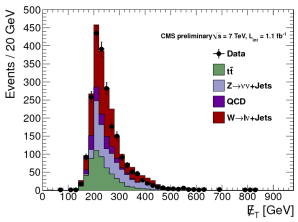
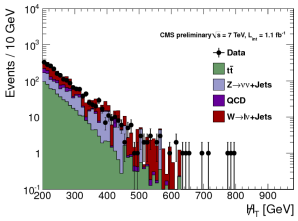
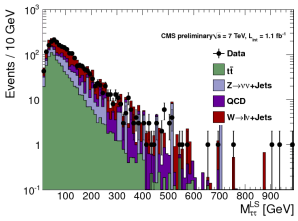
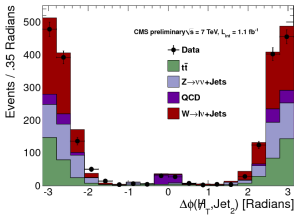
Abstract

A search for physics beyond the Standard Model with highly energetic jets, large momentum imbalance, and opposite-sign tau pairs in the final state is performed using data samples with integrated luminosities of 1 fb^{-1} of pp collisions at $\sqrt{s}$ = 7 TeV collected with the CMS detector at the LHC at CERN. The Standard Model backgrounds are estimated using data-driven techniques. The number of observed events is in good agreement with the predictions for Standard Model background processes and upper limits are set in the context of models of supersymmetry.

Approved Plots from SUS-11-007 (*click on plot to get .pdf*)

Figure	Abbreviated Caption
	Fig 1a: Distribution of missing transverse energy E_T^{miss} for SM MC and data after preselection. The MC distributions for the LM13 benchmark point are also shown.
	Fig 1b: Distribution of scalar sum of jet transverse energies (H_T) for SM MC and data after preselection. The MC distributions for the LM13 benchmark point are also shown.
	Fig 1c: Distribution of dilepton invariant mass $m(ll)$ for SM MC and data after preselection. The MC distributions for the LM13 benchmark point are also shown.

	Fig 2: Distribution of E_T^{miss} vs H_T for data. The high E_T^{miss} (high H_T) signal region is indicated with the blue dotted (red striped) region.
	Fig 3a: H_T distribution in the ttbar region.
	Fig 3b: Standard Model background enhanced sample depicting the effectiveness of the cut of abs{Δφ(MHT, j_2)} < 0.15 in selecting a high purity sample of QCD events.
	Fig 3c: MHT distribution in the Z→μμ + jets control region used to estimate Z→νν + jets.
	Fig 3d: MET distribution in the W+ jets control region after subtraction of all other backgrounds.
	Fig 4a: MET in a "loose" signal region without requiring τ_h isolation to enhance the statistics and compare the data-driven estimation of backgrounds with the observed distribution from data.

	
	Fig 4b: MHT in a "loose" signal region without requiring hadronic tau isolation to enhance the statistics and compare the data-driven estimation of backgrounds with the observed distribution from data.
	Fig 4c: Invariant mass of the like-sign τ pairs in a "loose" signal region without requiring hadronic tau isolation to enhance the statistics and compare the data-driven estimation of backgrounds with the observed distribution from data.
	Fig 4d: $\Delta\varphi(j_1, \text{MHT})$ in a "loose" signal region without requiring τ_h isolation to enhance the statistics and compare the data-driven estimation of backgrounds with the observed distribution from data.

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