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Comparison between MADGRAPH and PYTHIA data

analysis configuration

- CMSSW version: **CMSSW_2_2_6**
  running on our GRID site, T3_GR_Ioannina
- Data used are stored on the SE of T3_GR_Ioannina :
  https://cmsweb.cern.ch/phedex/prod/Data::Subscriptions?node=761

- jet algorithm: **SC7**
- good jets: $p_T \geq 50$ **GeV**
- eta cut applied: $|\eta| \leq 2.5$
- CALO jet corrections: **L2L3JetCorrectorSC7Calo**

- definitions:

  $H_T = \Sigma p_T$ over all jets

  R_{32} = # events with **≥3** good jets / # events with **≥2** good jets

- WWW page containing all the plots of this analysis:
  http://pc139.physics.uoi.gr/madgraph-WWW/high_pT_20091015a.php

MADGRAPH data

Datasets:

/QCD*nnn*to*nnn*-madgraph/Fall08_IDEAL_V9_v*nnn*/GEN-SIM-RECO

(Used ~50 files per slice)

| H_T-hat slice	cross section (pb)	# of events
0100_0250	15000000.00	310155
0250_0500	400000.00	234160
0500_1000	14000.00	186032
1000_inf	370.00	167717

PYTHIA data

Datasets:
/QCDDiJetPt*nnn*to*nnn*/Summer08_IDEAL_V9_v*nnn*/GEN-SIM-RECO

| p_T-hat slice	cross section (pb)	# of events
0015_0020	949441000.00000000000	129600
0020_0030	400982000.00000000000	101880
0030_0050	94702500.00000000000	169200
0050_0080	12195900.00000000000	103545
0080_0120	1617240.00000000000	51300
0120_0170	255987.00000000000	50085
0170_0230	48325.00000000000	51840
0230_0500	10623.20000000000	54000
0300_0580	2634.94000000000	60048
0380_0470	722.09900000000	93312
0470_0600	240.98300000000	27648
0600_0800	62.49230000000	30348
0800_1000	9.42062000000	20880
1000_1400	2.34357000000	24640
1400_1800	0.15685500000	27744
1800_2200	0.01381100000	22848
2200_2600	0.00129608000	22560
2600_3000	0.00011404000	28800
3000_3500	0.0000843180	20880
3500_inf	0.00000018146	34320

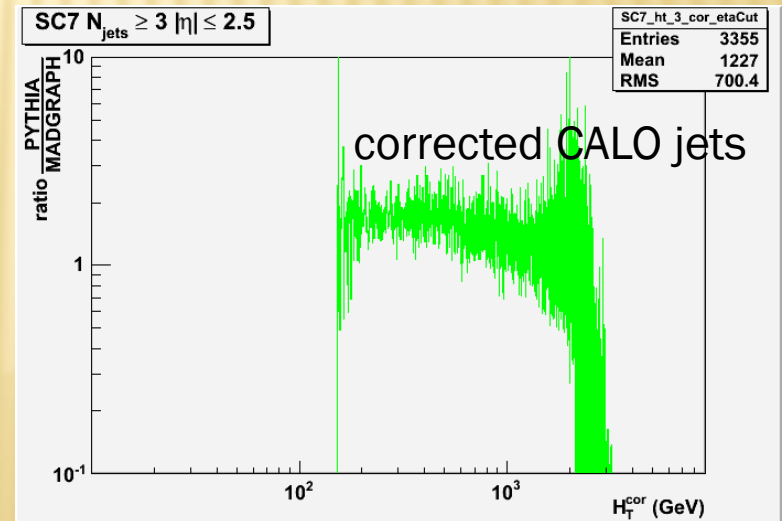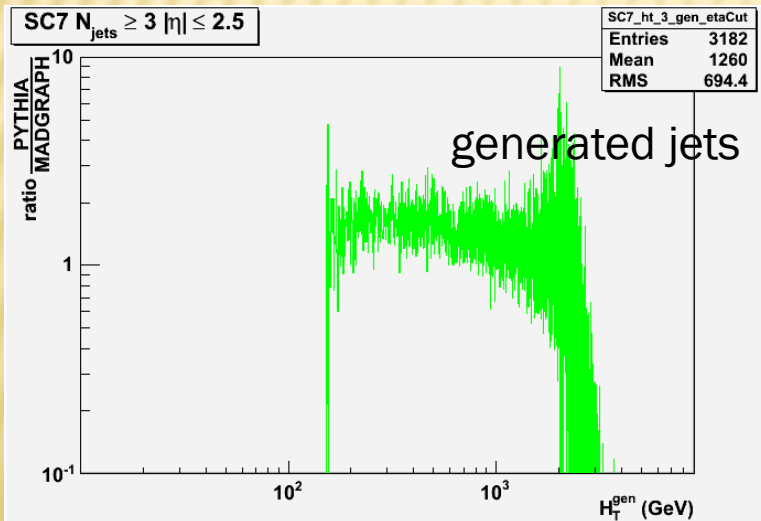# p_T distributions of the 1st jet
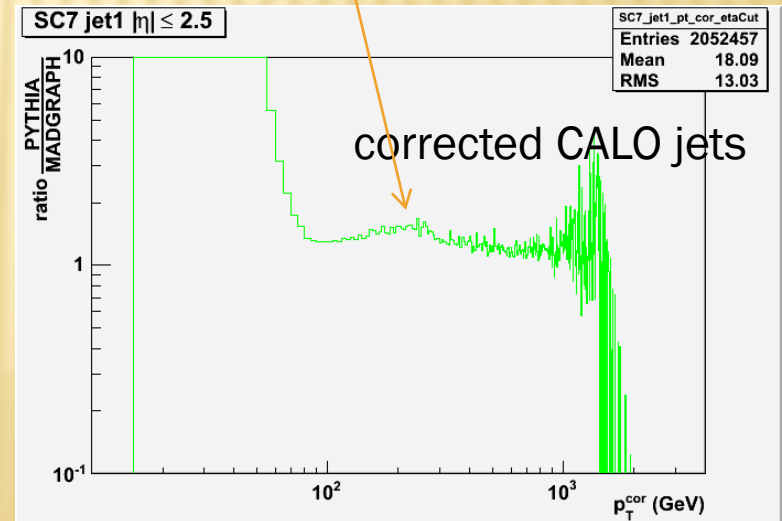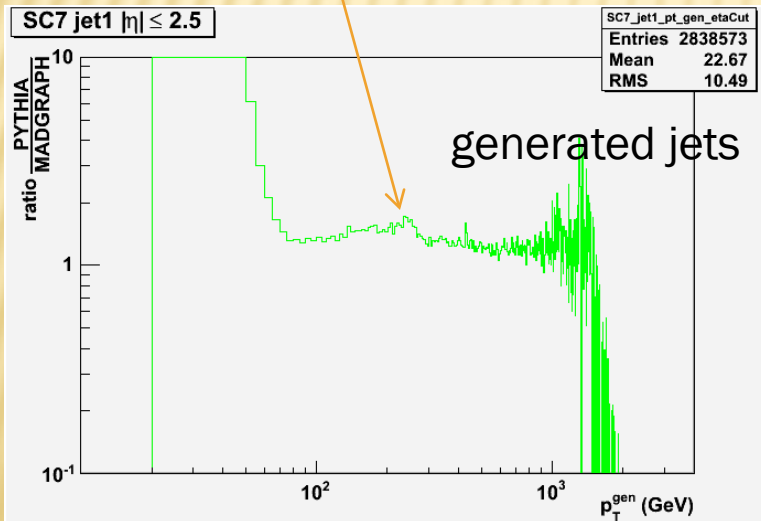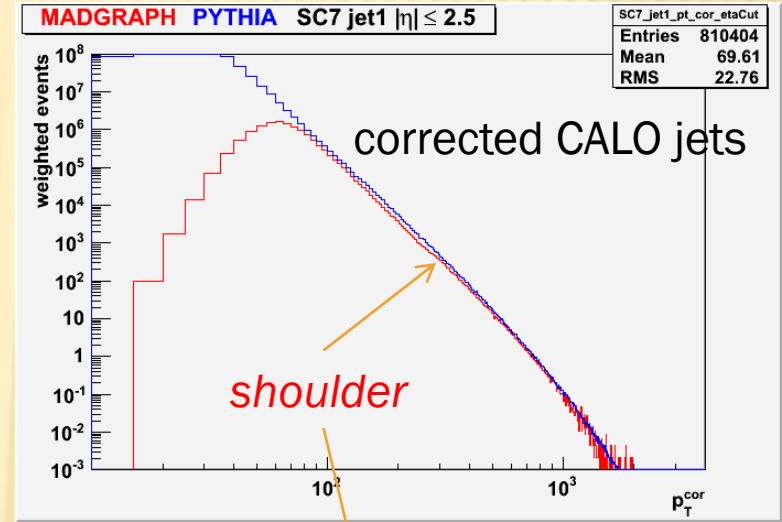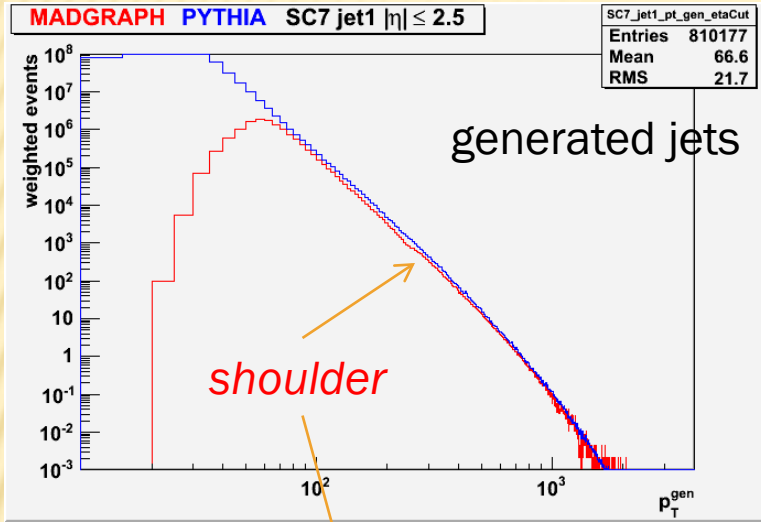
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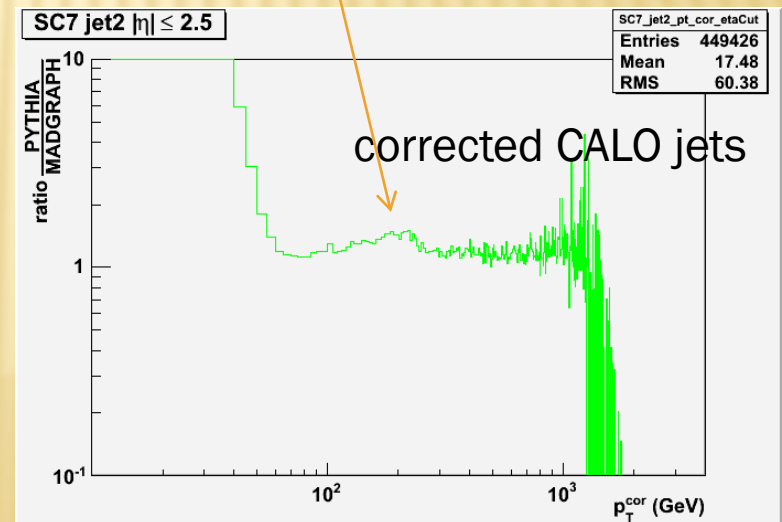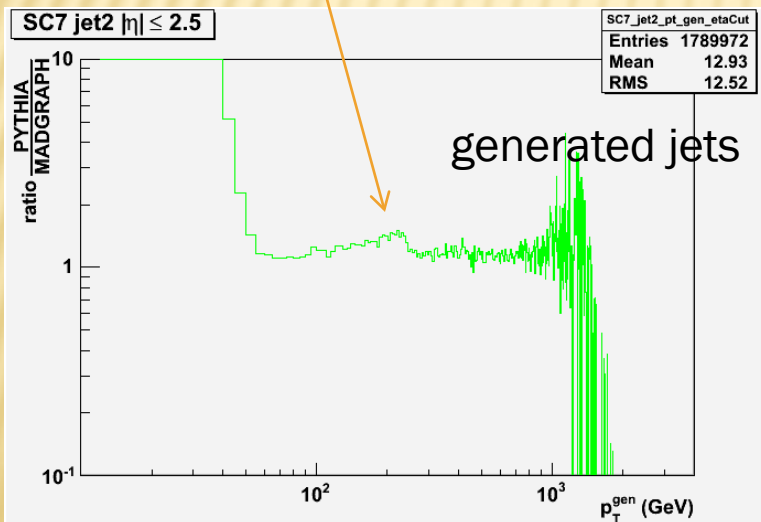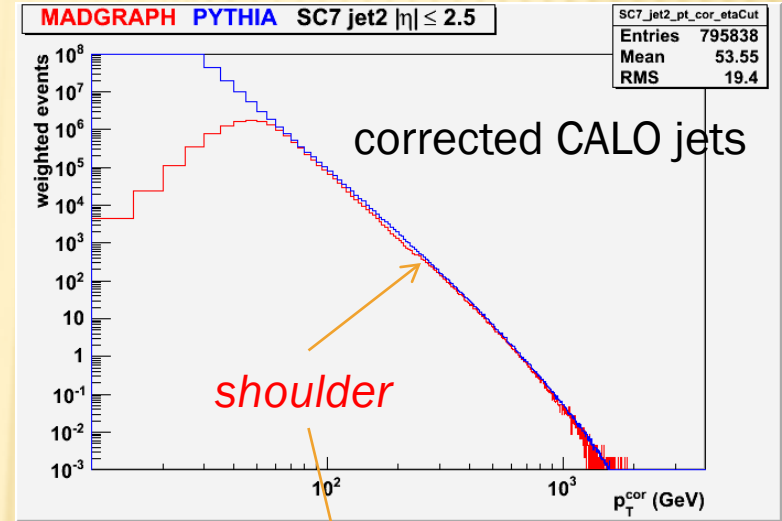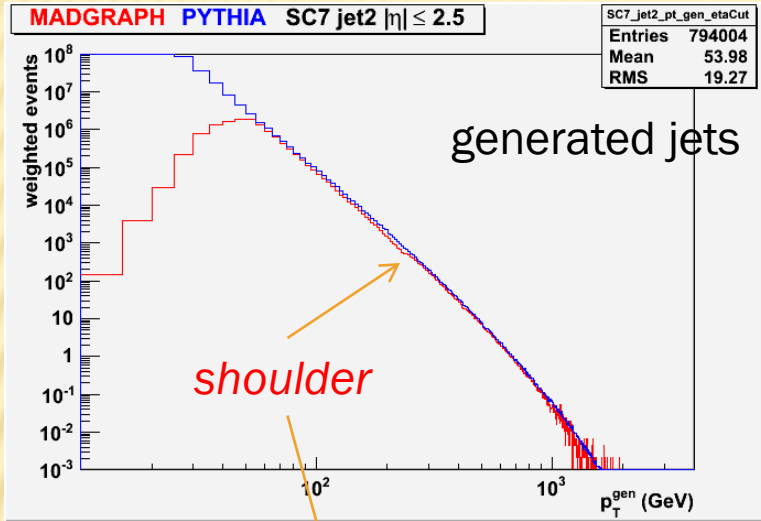
H_T distributions (all jets)
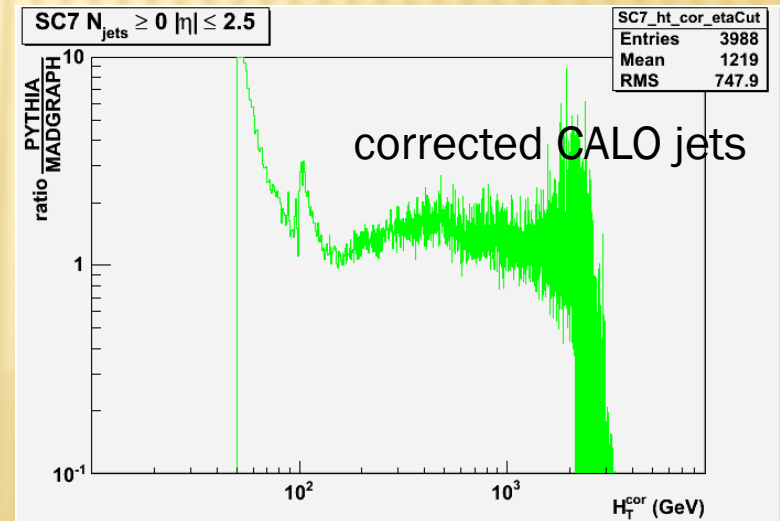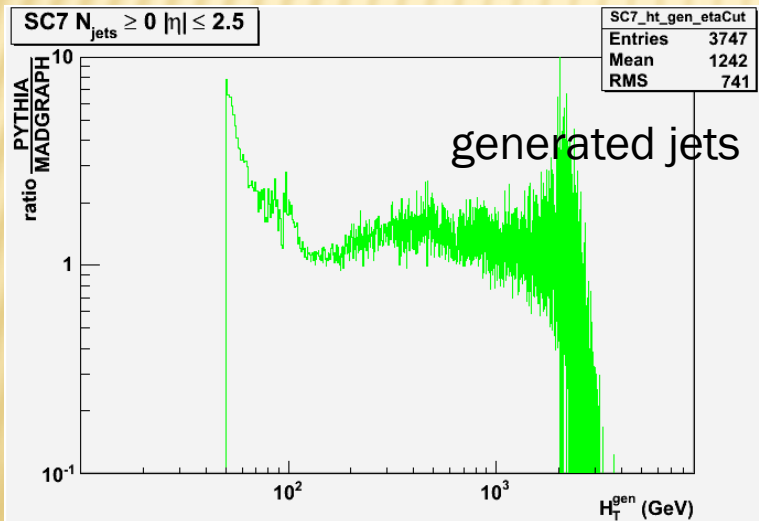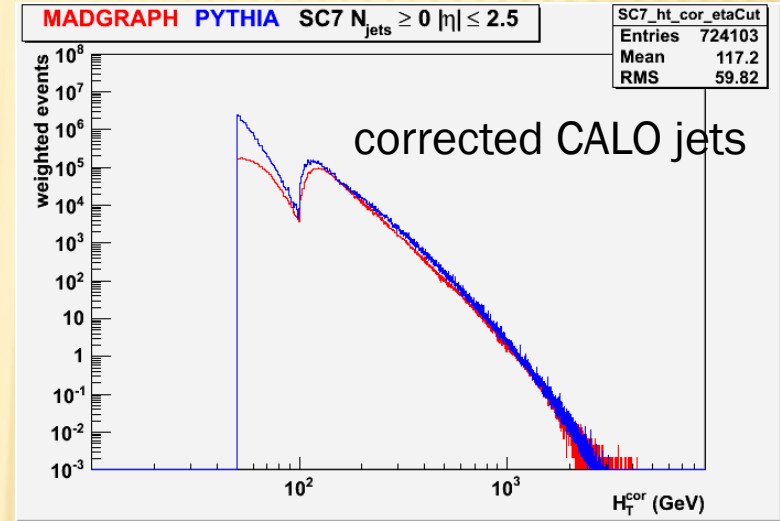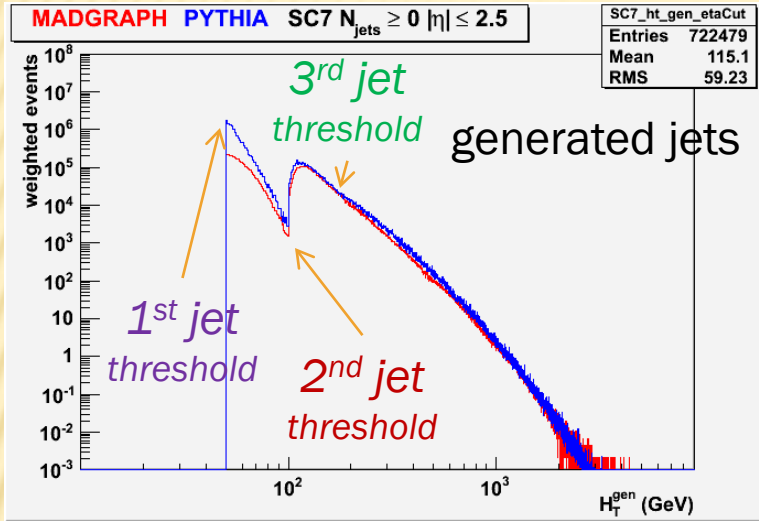
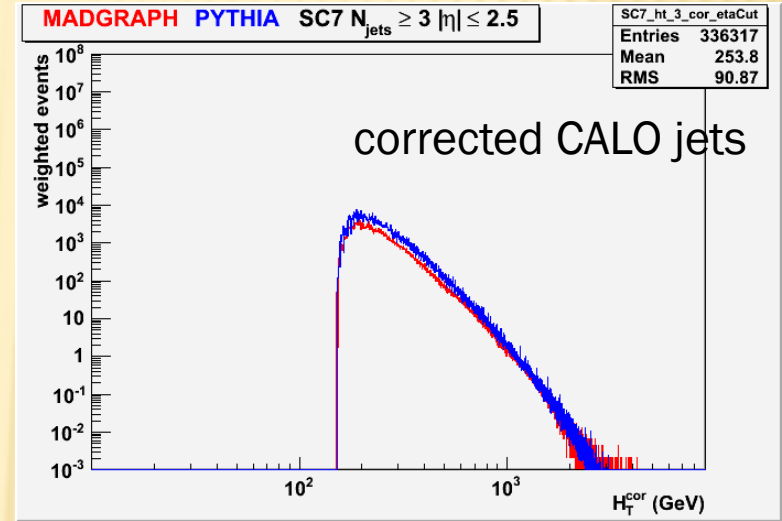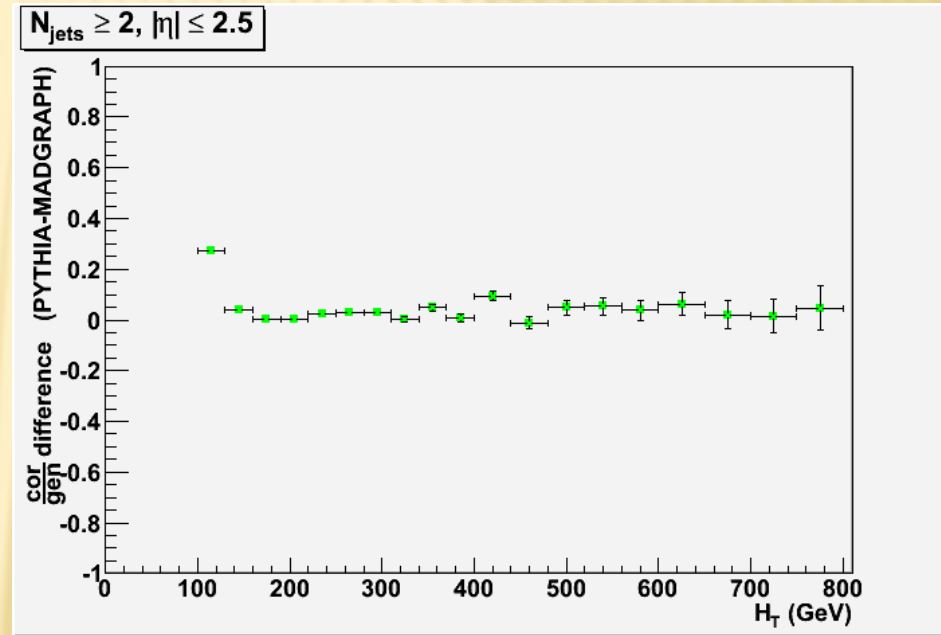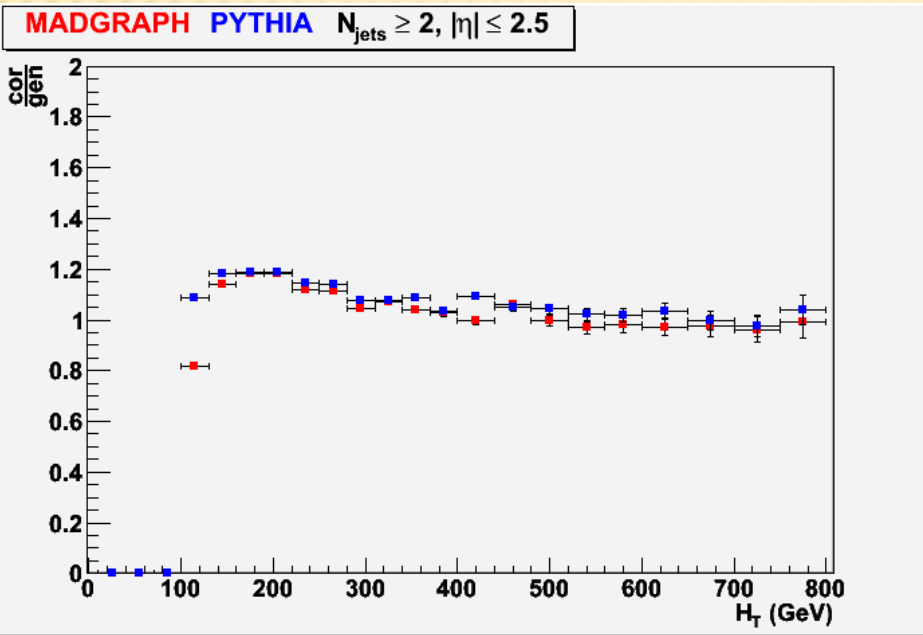# H$_T$ distributions (Njets≥2)
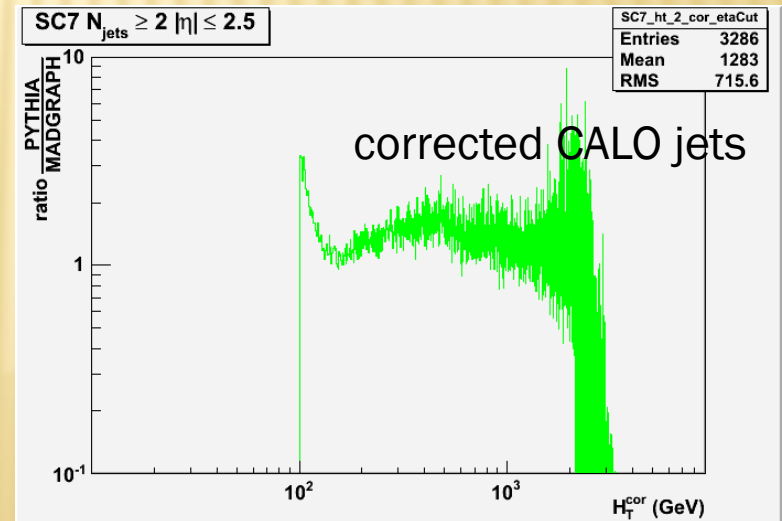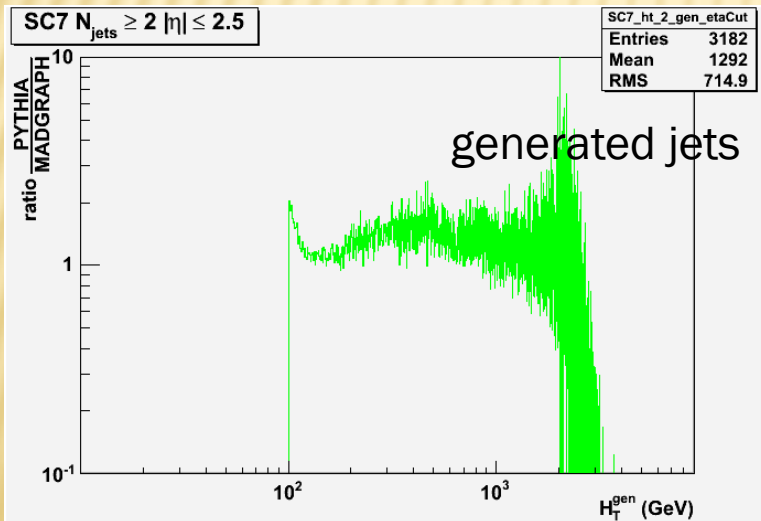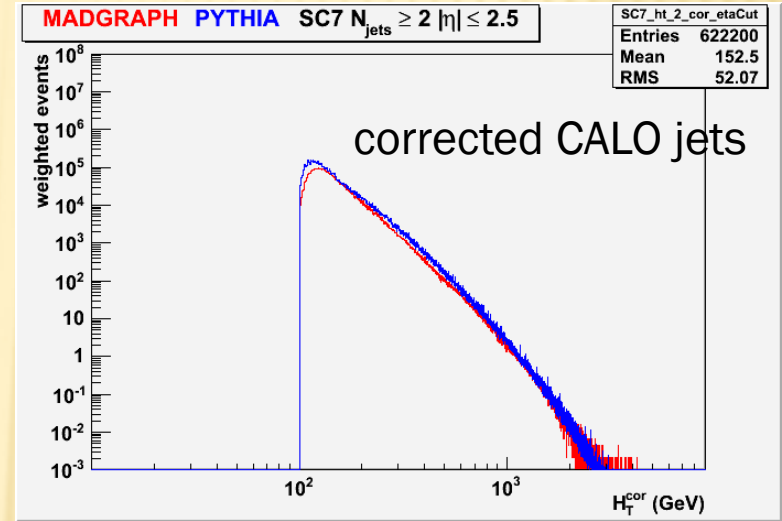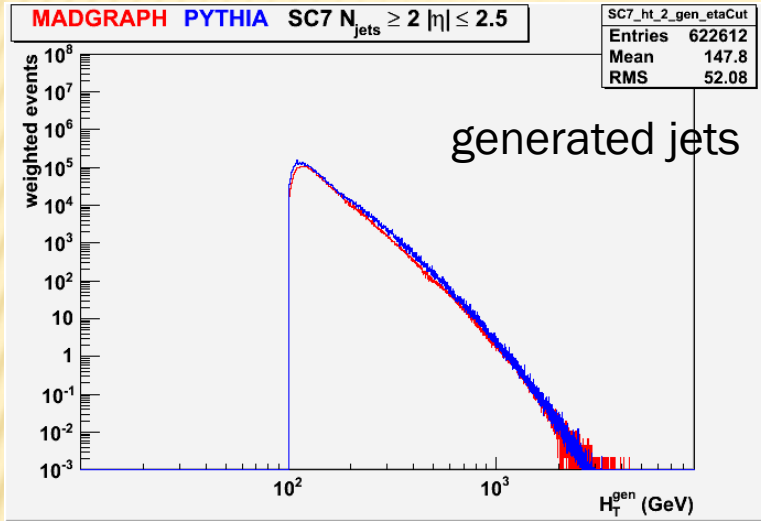
H_T distributions (Njets≥3)
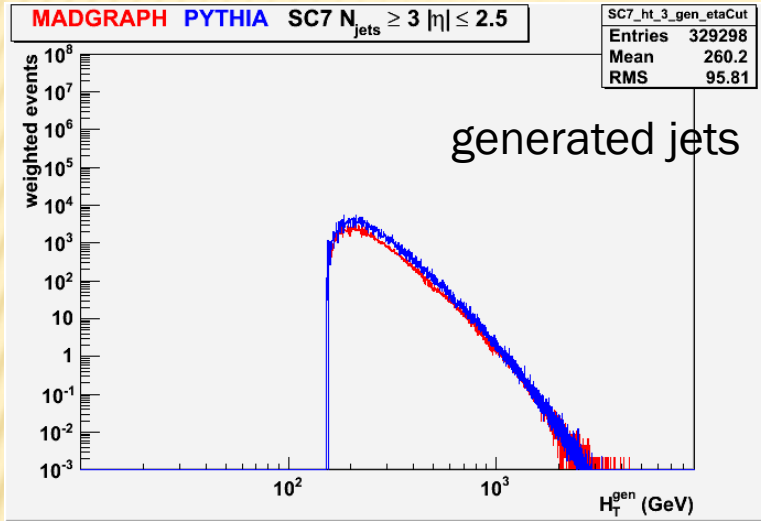
corrected/generated H_T ratio (Njets≥2)

error bars not significant
(correlated error were not taken into account)

corrected/generated H_T ratio (Njets≥3)
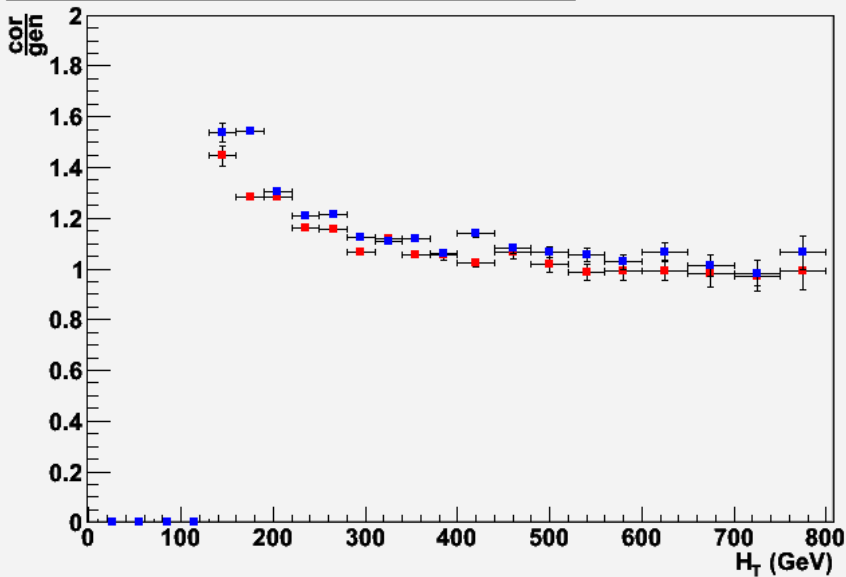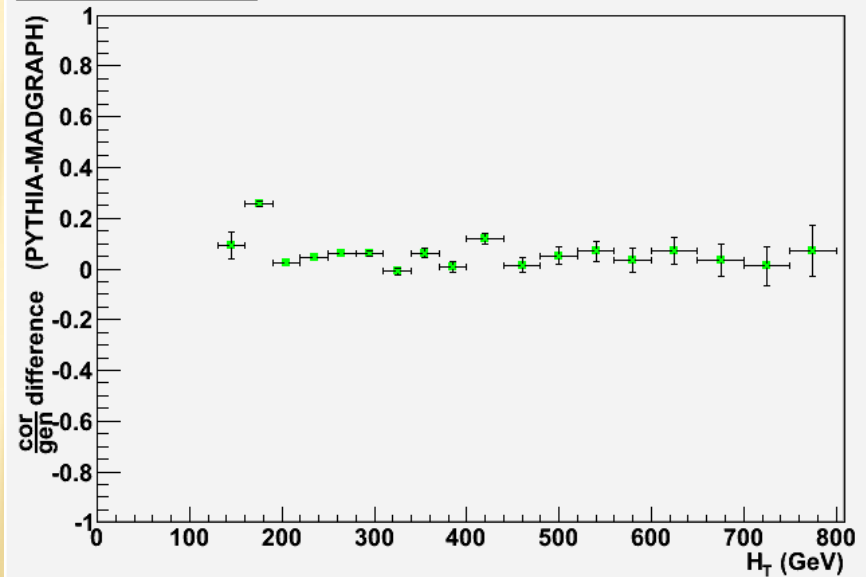
error bars not significant
(correlated error were not taken into account)

ratio R_{32}
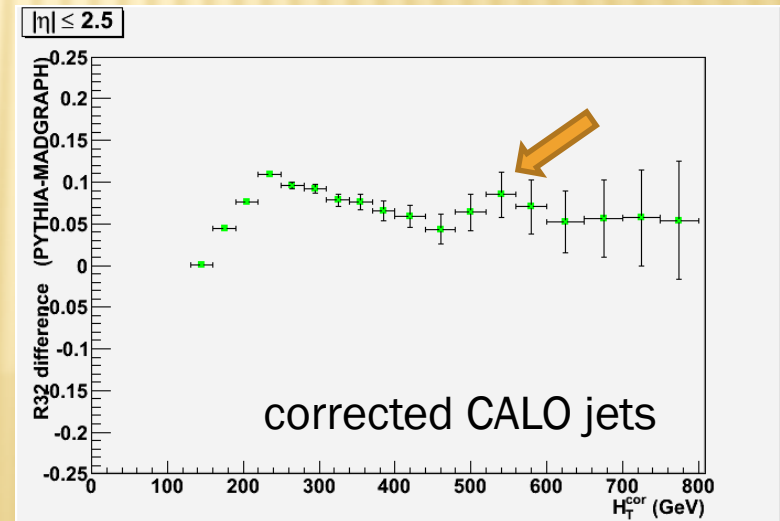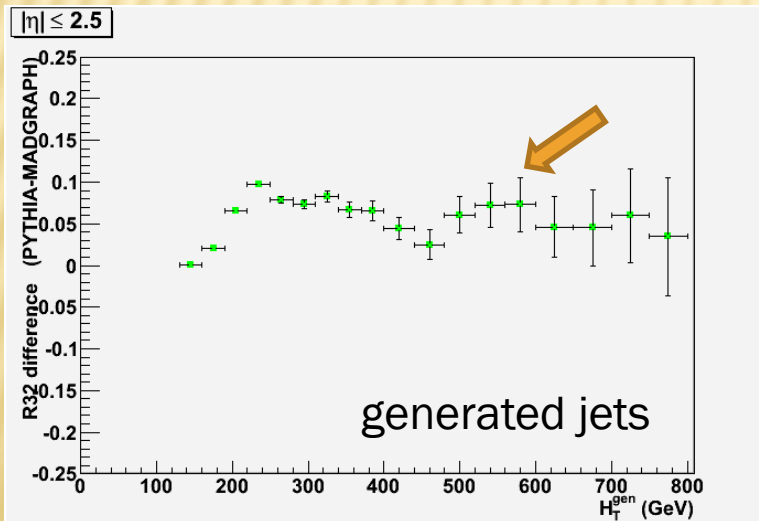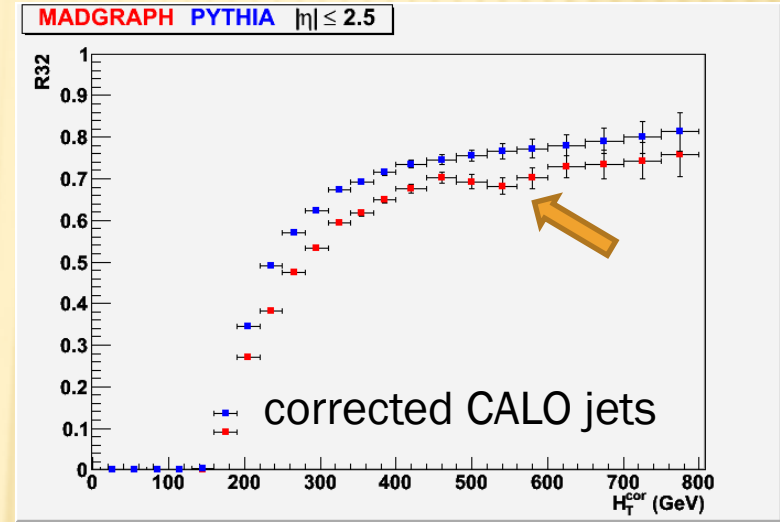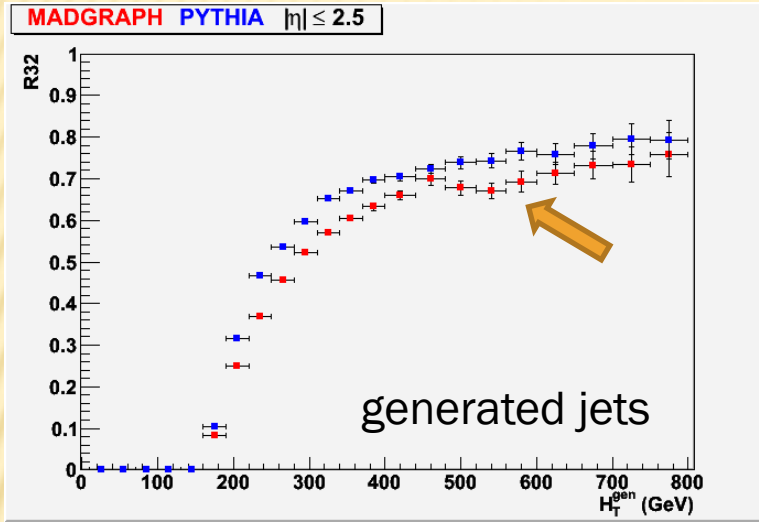
conclusions

* Data produced with PYTHIA and MADGRAPH differ
  + jet p_T distributions
  + H_T distributions
  + ratios (corrected/generated and R32)
  + all these plots can be seen at
    http://pc139.physics.uoi.gr/madgraph-WWW/high_pT_20091015a.php
* The plot differences are quite continuous, but
  + there is a peak near p_T~200 GeV in the jet p_T distributions
  + there is a peak near H_T~550 GeV in the R32 ratio
* From the corrected/generated ratio plots,
  the jet corrections seem to be the same for PYTHIA and MADGRAPH as expected
* MADGRAPH systematically underestimates ratio R32
* Increased by 50% the cross section of the last three MADGRAPH data slices,
  to test the impact on the plots under study
  + the jet p_T distributions came closer (in log scale...)
  + the peaks observed did not go away
  + all these plots can be seen at
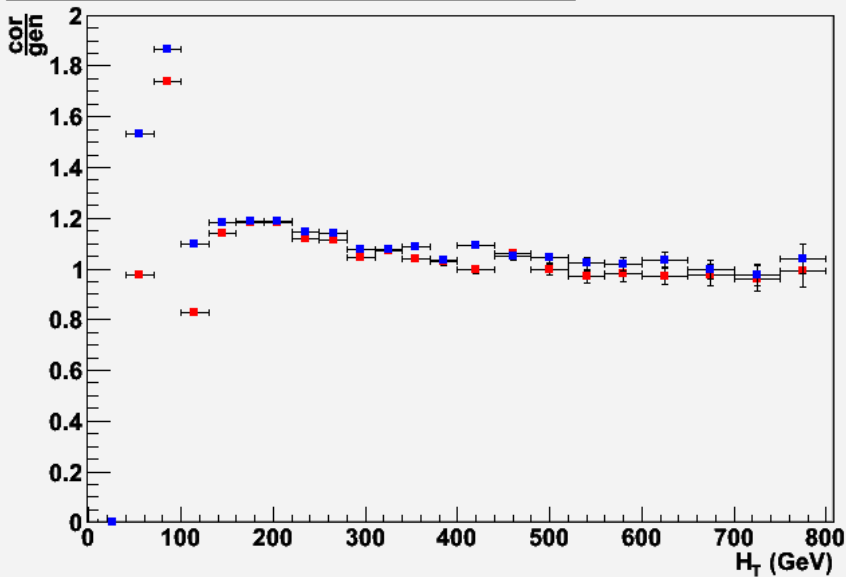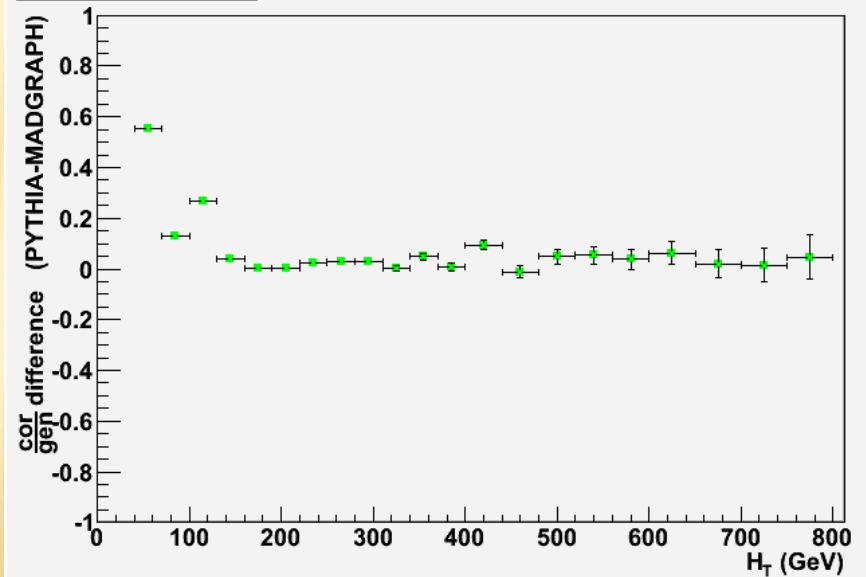   http://pc139.physics.uoi.gr/madgraph-WWW/high_pT_20091015b.php

backup slides

corrected/generated H_T ratio (all jets)

error bars not significant
(correlated error were not taken into account)