t-tbar → 6jets
quick look at
Optimal Jet Finder jets

LAPP, 28 Feb 2007

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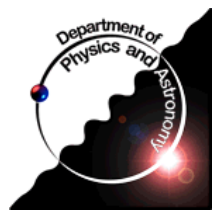


Samples

- Generated by Damir
- Sample 5204
  - MC@NLO ttbar→6jets, full simulation, Athena 11.0.42
- AOD produced using Athena 12.0.5
  - 1050 events, E_T > 7 GeV filter on jets
  - ParticleJetContainer
    - each produced which its own H1 weights
      - Cone4TowerParticleJets — Cone4TopoParticleJets
      - ConeTowerParticleJets — ConeTopoParticleJets
      - Kt4TowerParticleJets — Kt4TopoParticleJets
      - Kt6TowerParticleJets — Kt6TopoParticleJets
  - JetCollection using OJF
    - no proper H1 weights available: use Cone weights
    - number of jets fixed to 6
    - R parameter set to 0.7
      - FuzzyTowerJets — FuzzyClusterJets

Jet-parton matching

- Study events with “true” jet hypothesis
- Matching criteria
  - For each parton, look for a matching jet
    - restrict search in a region limited by $\Delta R_{max} = 0.2$
    - keep the closest jet in this region
  - Demand that a jet be matched only once
    - matching efficiencies depends on interparton distances
      - same top combinations

$\langle \Delta R(u\text{-}b) \rangle$	$= 2.220 \pm 0.002$	$\langle \Delta R(ubar\text{-}bbar) \rangle = 2.219 \pm 0.002$
$\langle \Delta R(u\text{-}dbar) \rangle$	$= 2.008 \pm 0.002$	$\langle \Delta R(ubar\text{-}d) \rangle = 2.010 \pm 0.002$
$\langle \Delta R(dbar\text{-}b) \rangle$	$= 2.037 \pm 0.002$	$\langle \Delta R(d\text{-}bbar) \rangle = 2.036 \pm 0.002$

      - other 9 combinations

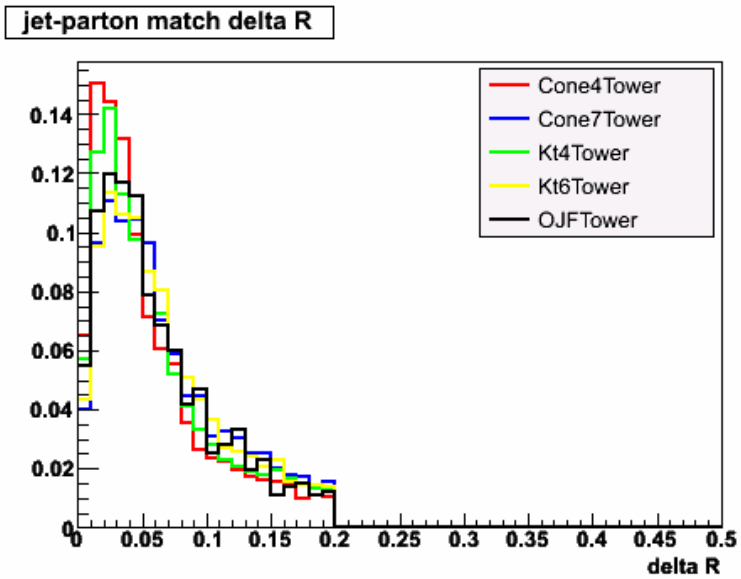
$\langle \Delta R \rangle \approx 2.40$

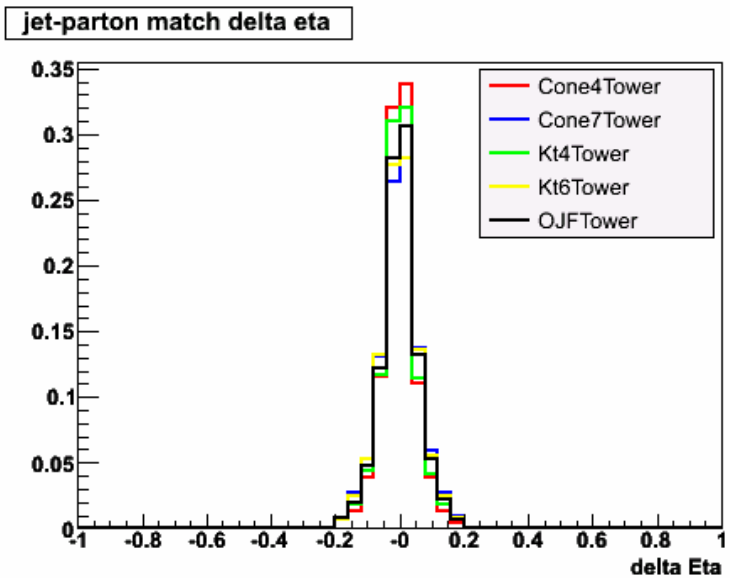
Parton matching efficiencies

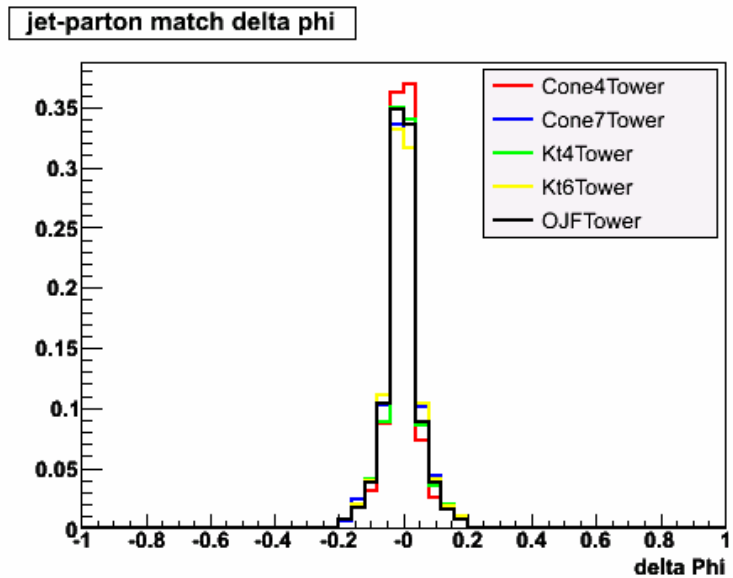
- no p_T jet cuts applied

5204 sample ttbar->6jets Athena 12.0.5	Cone4TowerParticleJets	Cone4TopoParticleJets	ConeTowerParticleJets	ConeTopoParticleJets	Kt4TowerParticleJets	Kt4TopoParticleJets	Kt6TowerParticleJets	Kt6TopoParticleJets	**FuzzyTowerJets**	**FuzzyClusterJets**
number of events	1049	1049	1049	1049	1049	1049	1049	1049	1049	1049
at least 6 jets in |eta| < 3	870	967	847	929	1039	1024	1043	1024	675	564
all matched partons 1 to 1	153	162	52	48	205	202	153	151	11	14
matching efficiency	**17.6%**	**16.8%**	**6.1%**	**5.2%**	**19.7%**	**19.7%**	**14.7%**	**14.7%**	**1.6%**	**2.5%**
u	73.6%	73.7%	58.7%	57.5%	74.8%	74.6%	70.0%	71.3%	59.3%	60.8%
dbar	69.5%	68.4%	51.8%	49.8%	71.5%	72.2%	65.8%	66.3%	51.0%	52.1%
b	78.4%	78.8%	68.6%	64.8%	79.0%	79.8%	76.8%	76.8%	68.7%	69.0%
ubar	72.6%	75.2%	60.9%	59.0%	78.3%	78.0%	72.8%	74.7%	61.1%	64.5%
d	69.4%	69.3%	52.8%	51.2%	72.2%	72.5%	68.1%	68.7%	51.6%	52.7%
bbar	77.0%	76.9%	65.6%	62.1%	77.9%	78.6%	74.5%	75.3%	68.9%	66.1%
at least 6 jets in |eta| < 3	870	967	847	929	1039	1024	1043	1024	675	564
all matched partons 1 to 1	153	162	52	48	205	202	153	151	11	14
assume 6 highest pt jets	53	57	25	21	57	56	47	47	11	14
matching efficiency	**6.1%**	**5.9%**	**3.0%**	**2.3%**	**5.5%**	**5.5%**	**4.5%**	**4.6%**	**1.6%**	**2.5%**
at least 6 jets in |eta| < 3	870	967	847	929	1039	1024	1043	1024	675	564
exactly 6 jets	250	127	222	142	19	41	23	50	675	564
all matched partons 1 to 1	22	12	6	3	1	3	4	5	11	14
matching efficiency	**2.5%**	**1.2%**	**0.7%**	**0.3%**	**0.1%**	**0.3%**	**0.4%**	**0.5%**	**1.6%**	**2.5%**

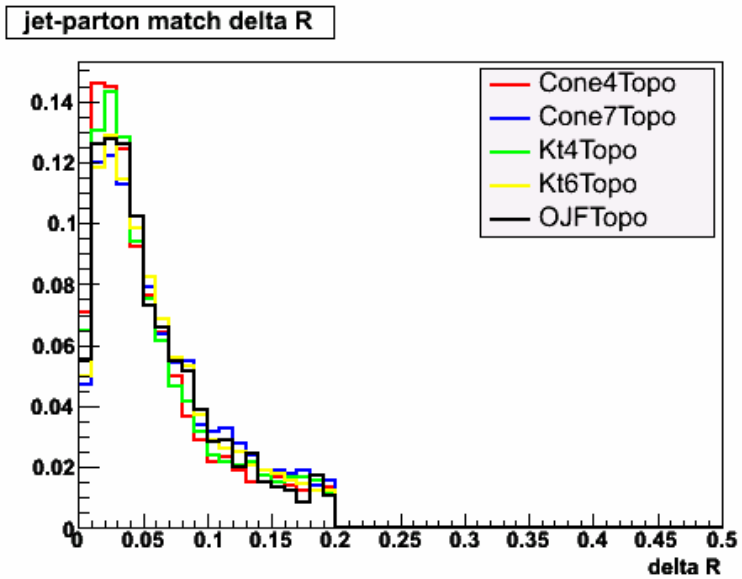
Normalized distributions: towers

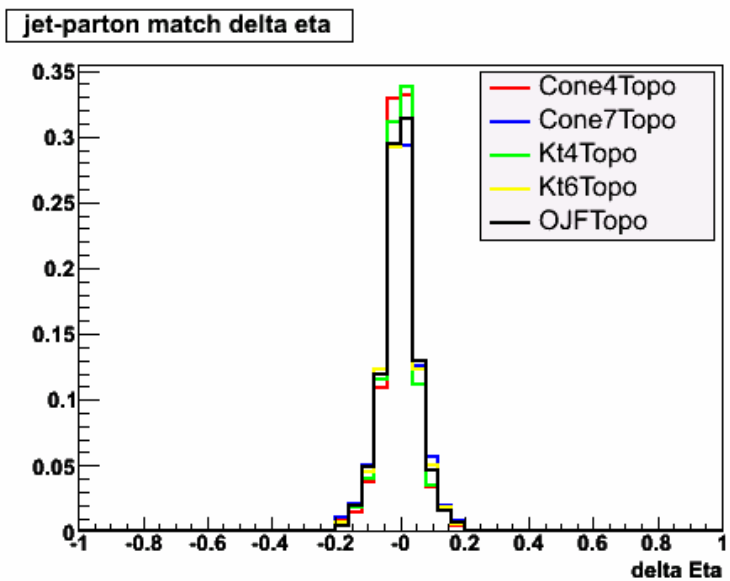


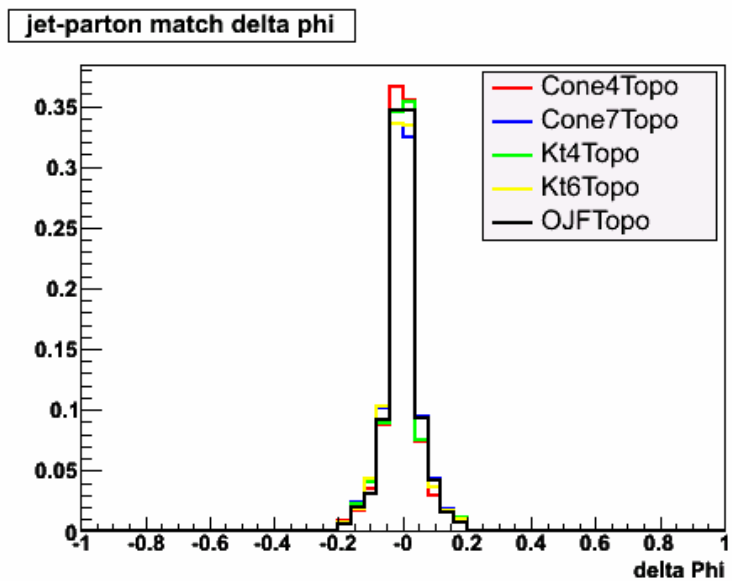




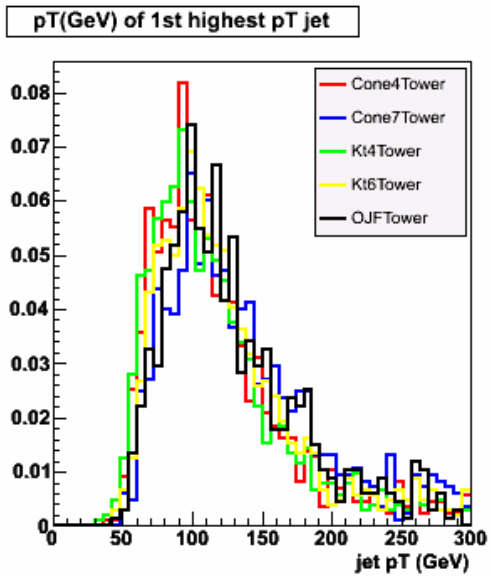
Normalized distributions: topo clusters

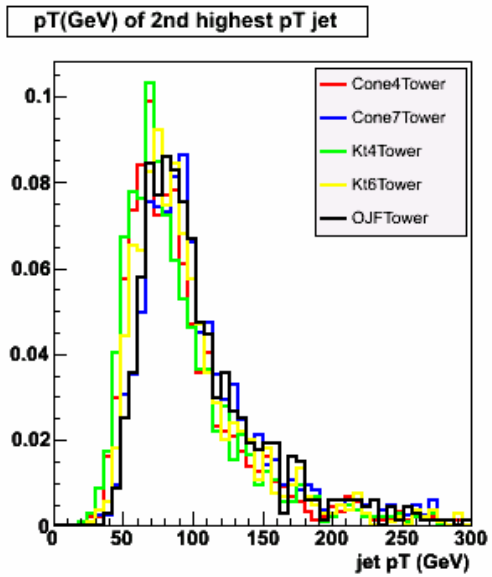


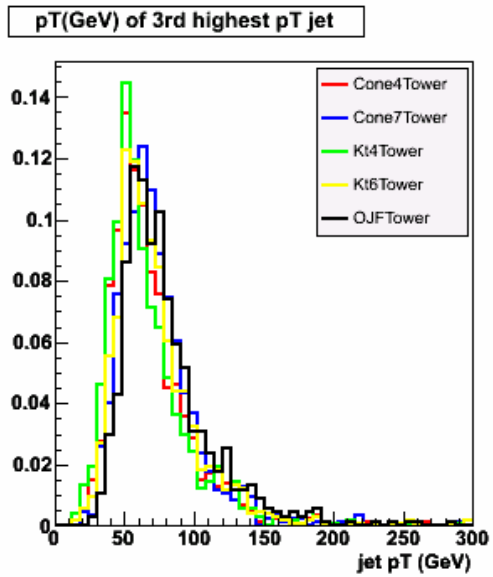


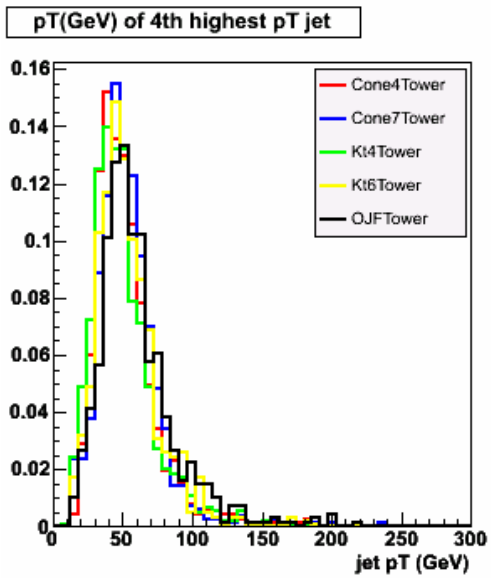


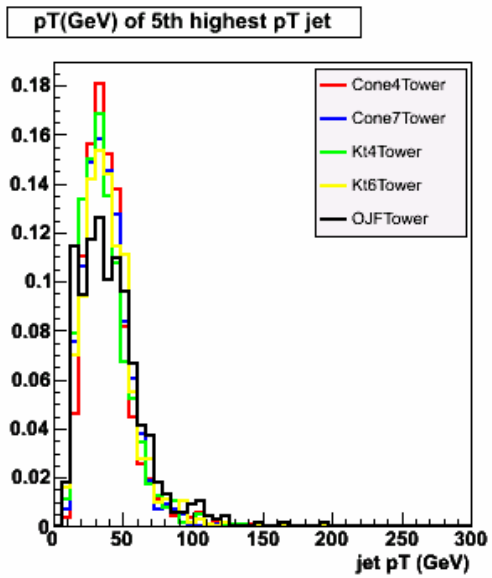
Normalized p_T distributions: towers

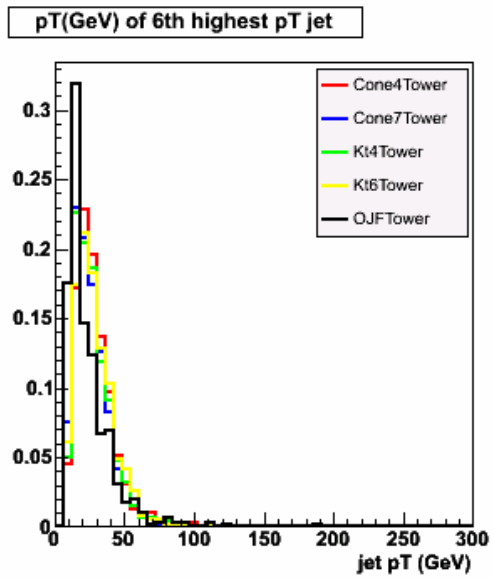




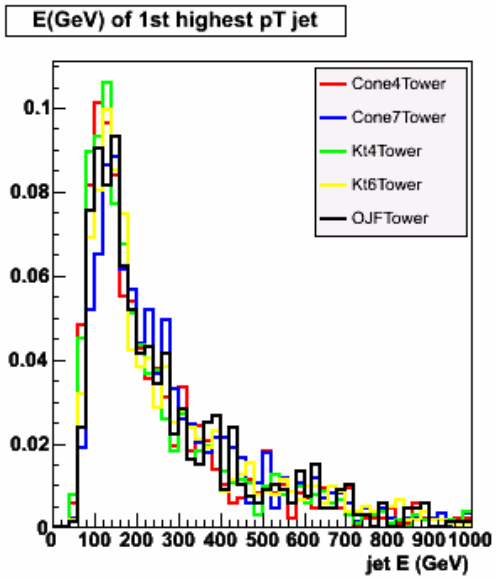


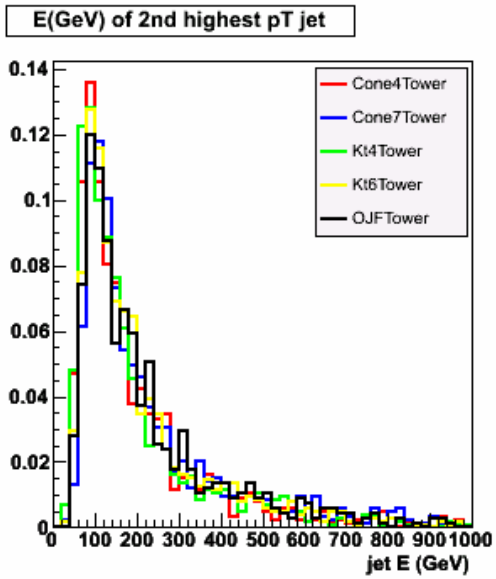


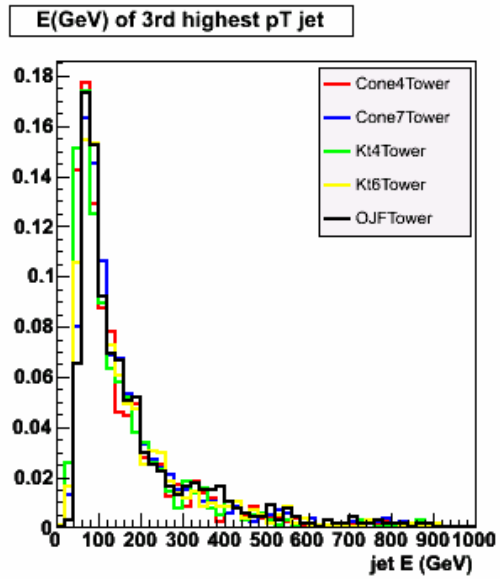


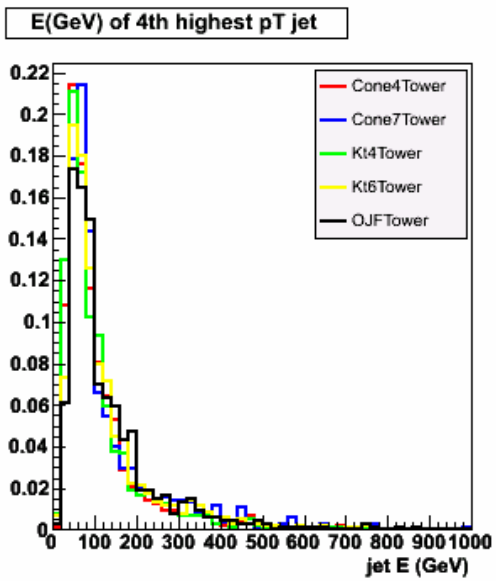


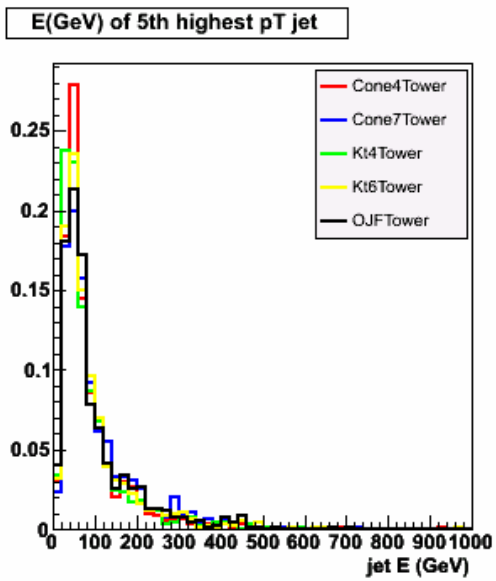
Normalized E distributions: towers

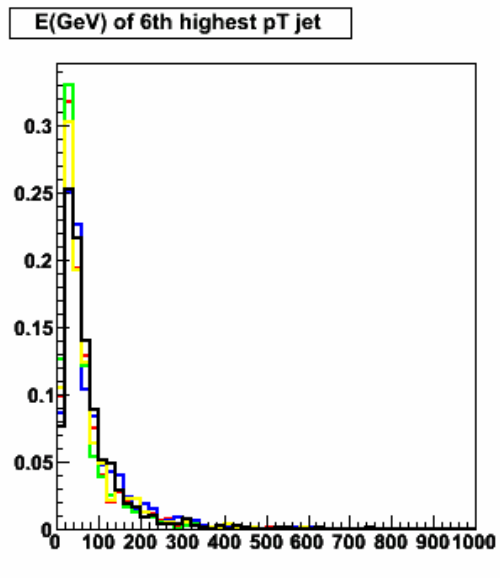




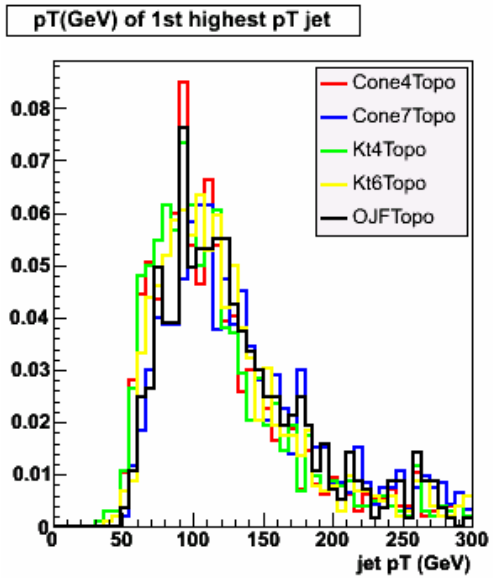


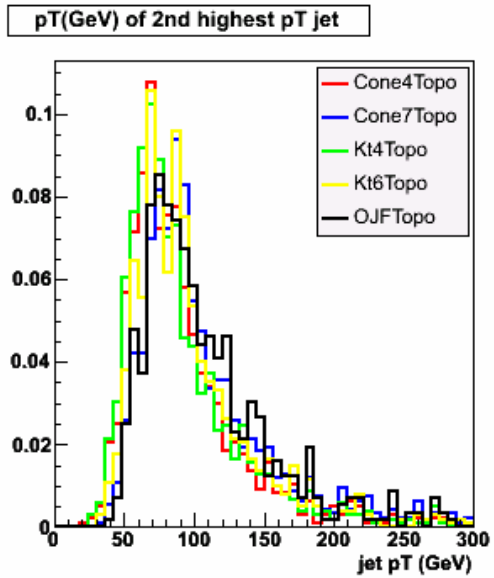


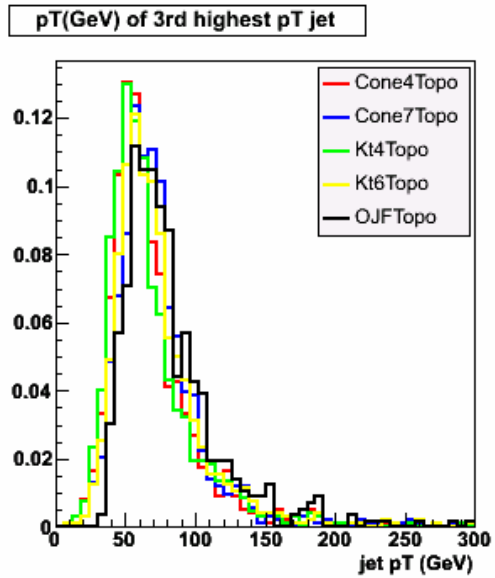


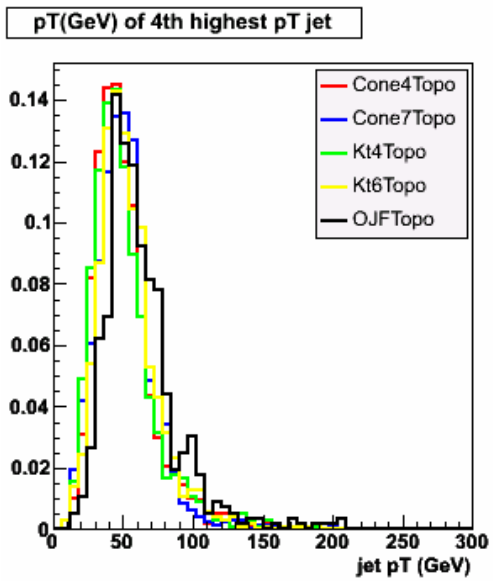


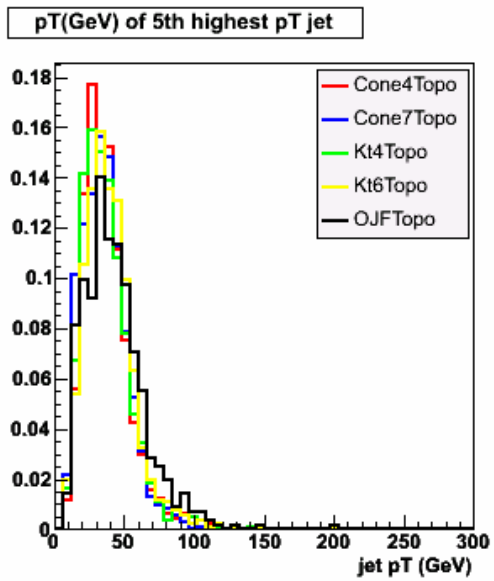
Normalized p_T distributions: topo clusters

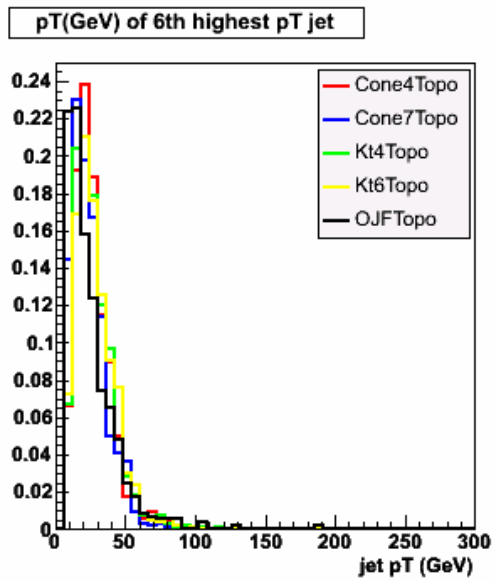




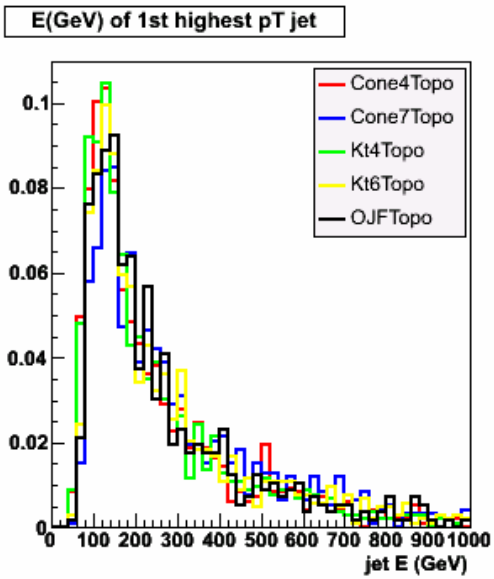


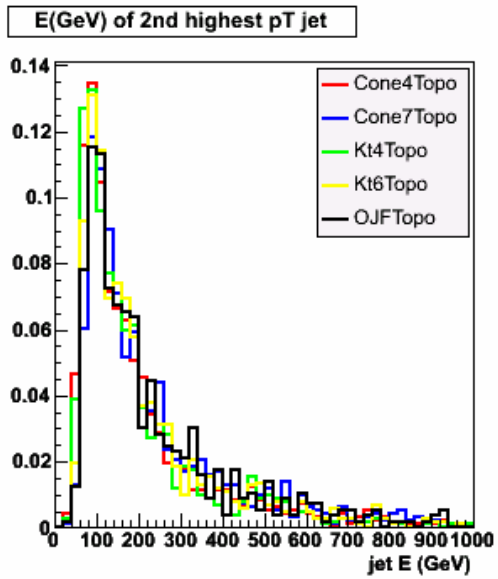


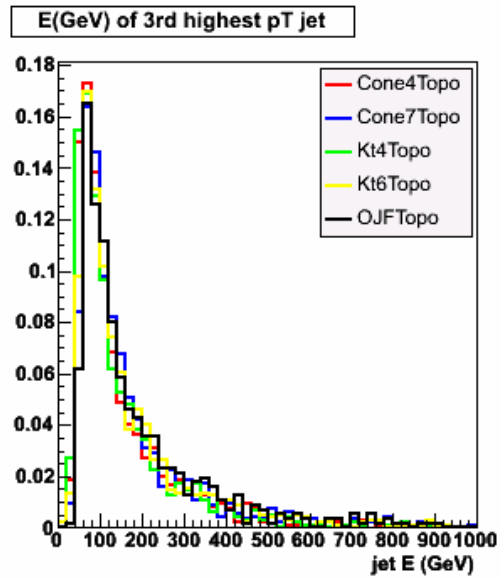


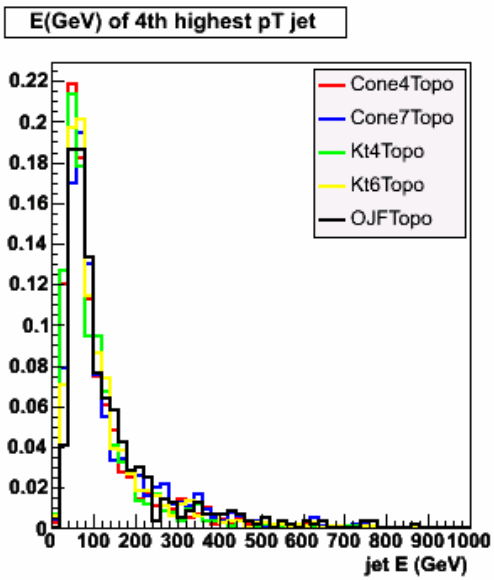


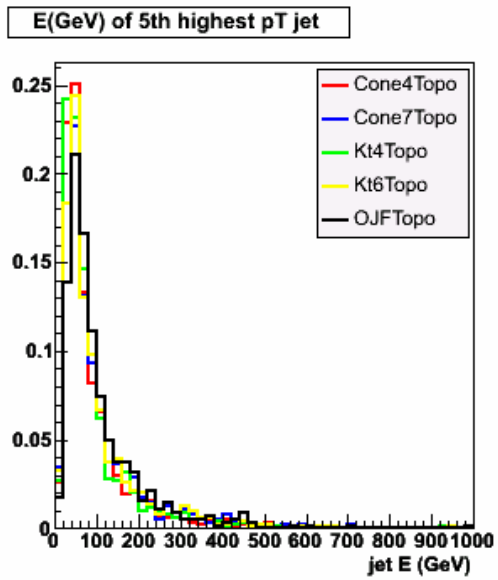
Normalized E distributions: topo clusters

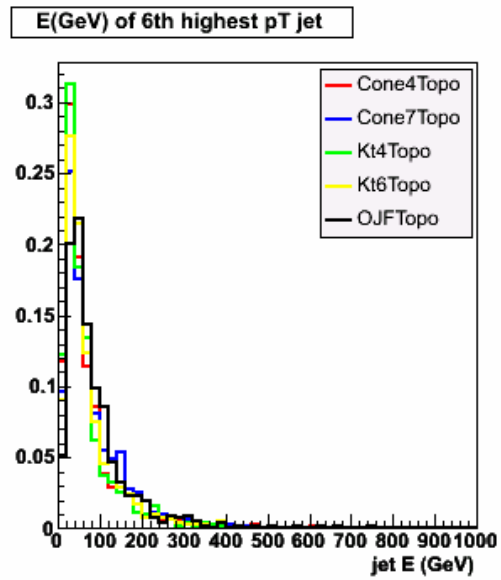












Comments

- Very encouraging results for OFJ
  - here fixed number of jet mode!
  - should try with number of jets not fixed
    - adjust ω parameter
  - more events would allow mass plots
    - requires 6 matched partons 1 to 1