Underlying Event Generator Study

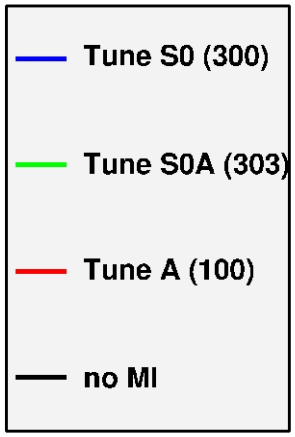
Z.Rúriková

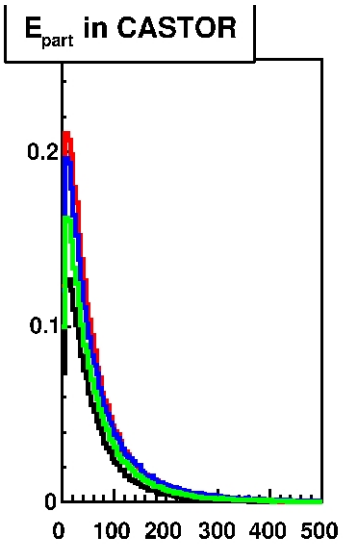
SMIX meeting
5. May 2008

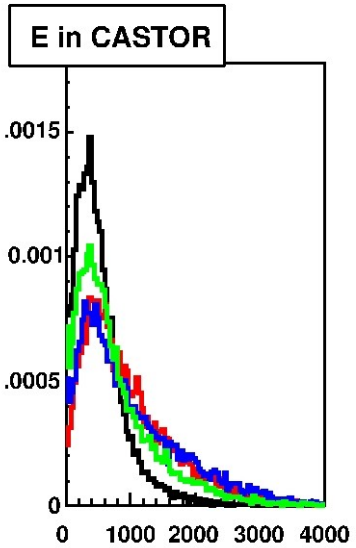
- Energy smearing in CASTOR
- Long range correlations
- New plots

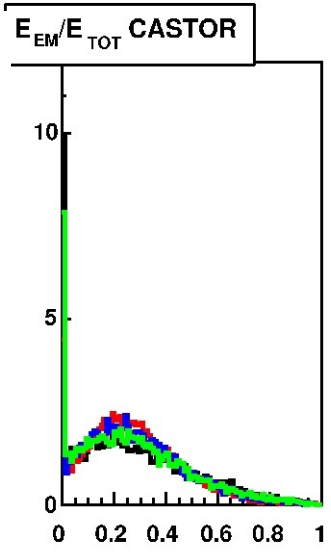
Particles in CASTOR

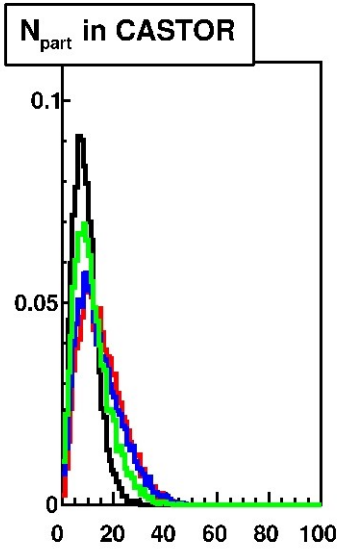
Min Bias:











Particle Energy Smearing in CASTOR

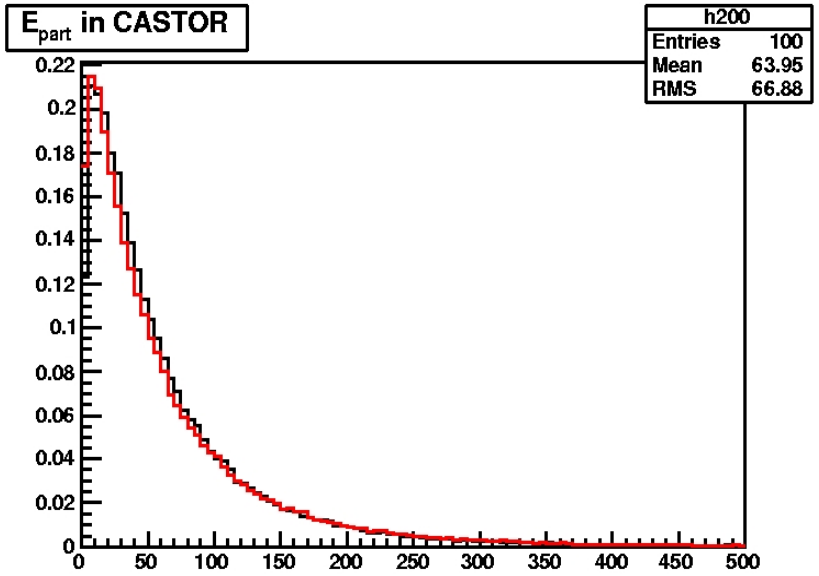
- E_{part} smeared according to resolution measured in BT07

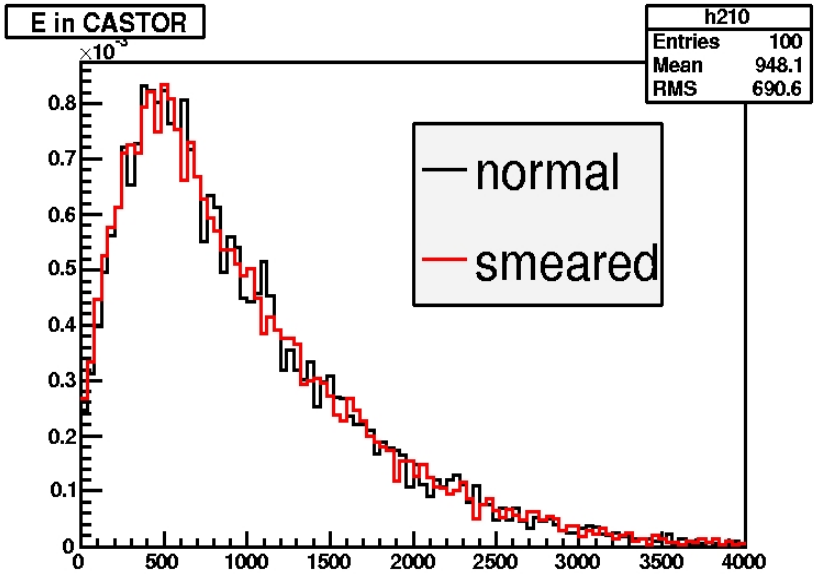
  EM: $\sigma/E = 0.063 + 0.886/\sqrt{E}$

  HAD: $\sigma/E = 0.097 + 2.733/\sqrt{E}$

- no spatial resolution applied yet

- **Minimum Bias tune A (itune= 100):**

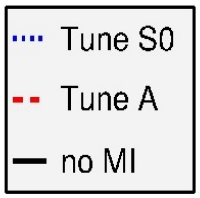


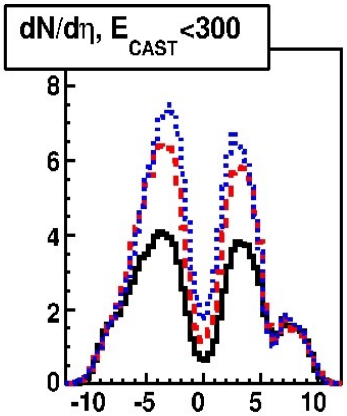


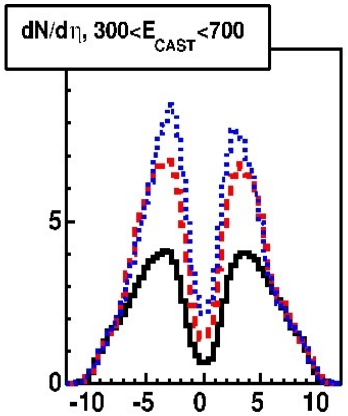
Ch. Particle Multiplicities

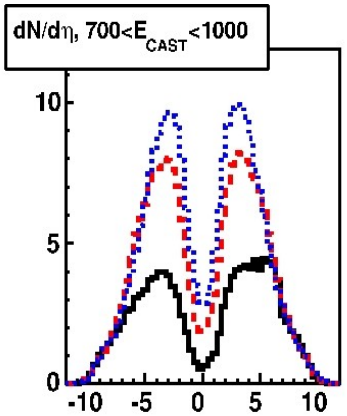
Without energy smearing in Castor:

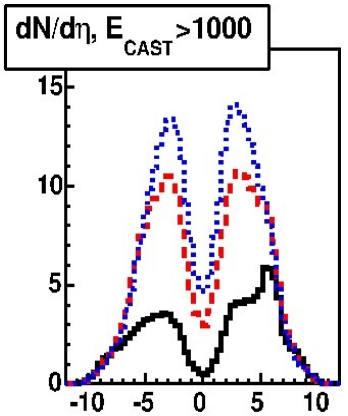
Min Bias:



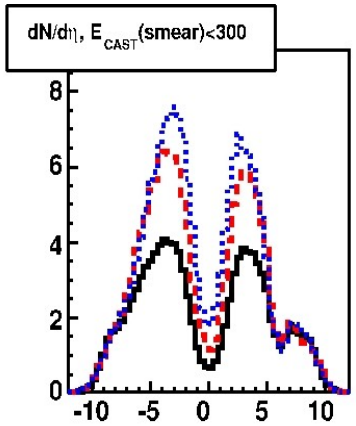


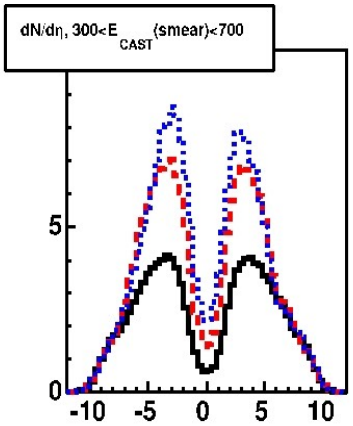


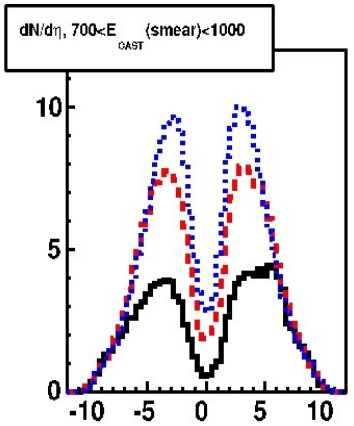


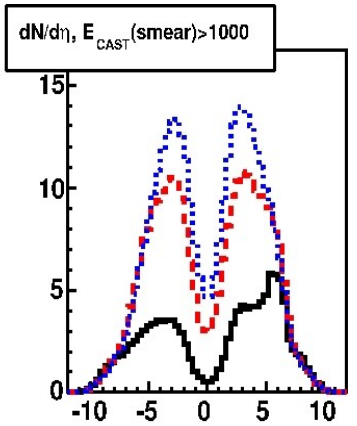


With energy smearing in Castor:





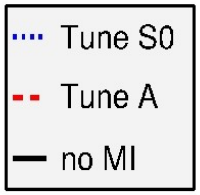


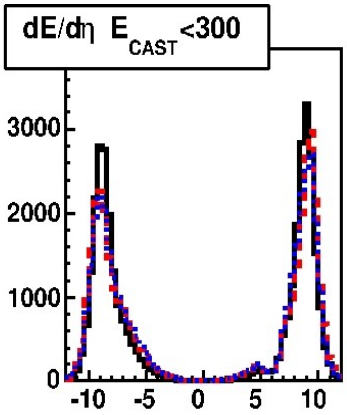


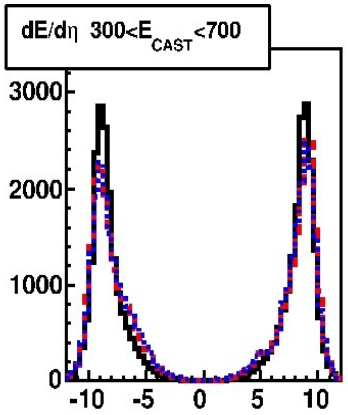
Particle Energy Flow

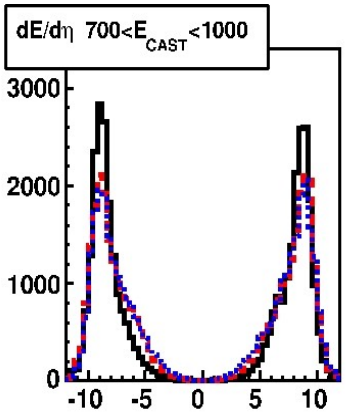
Without energy smearing in Castor:

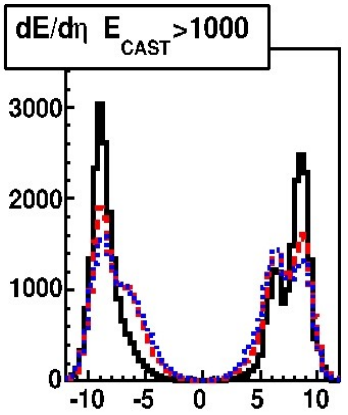
Min Bias:



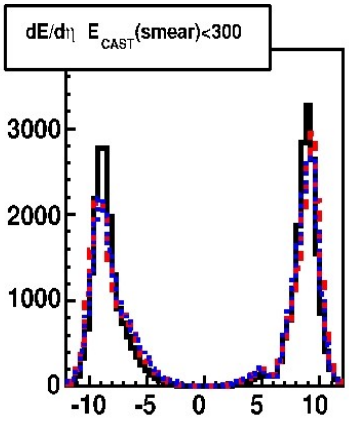


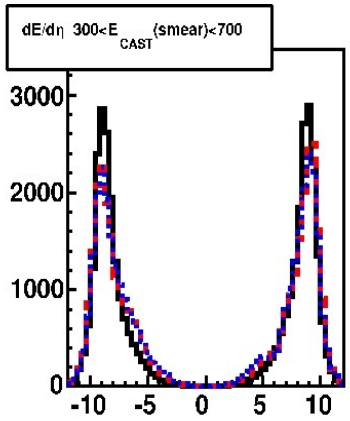


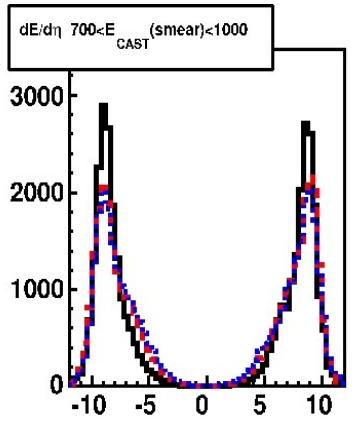


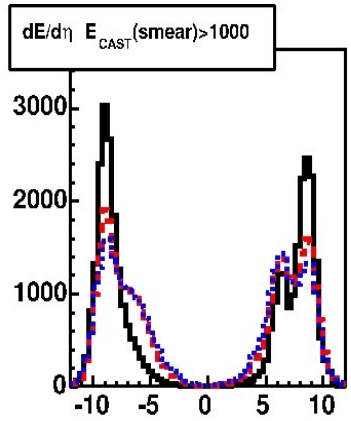


With energy smearing in Castor:





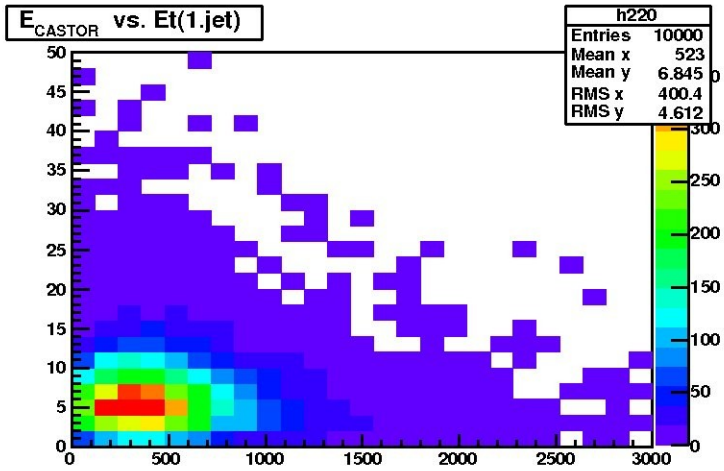


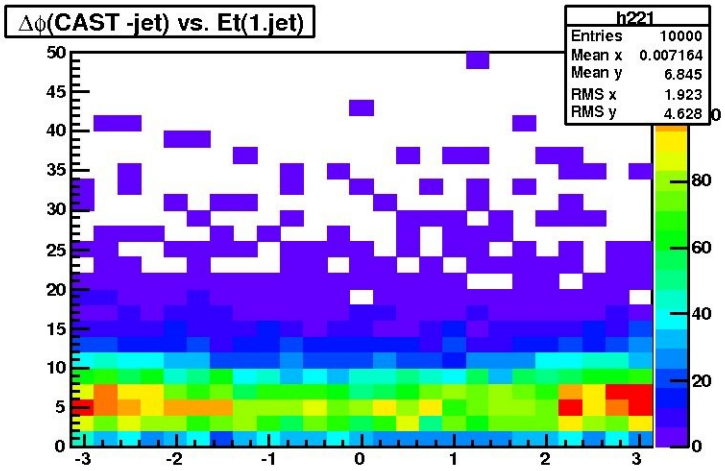


Studying Long Range Correlations

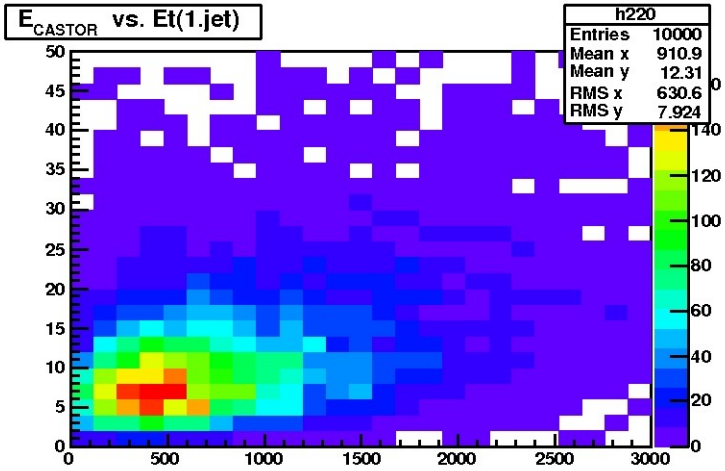
- how does activity in central region (|η|<2.5) correlate with activity in forward CASTOR region ?

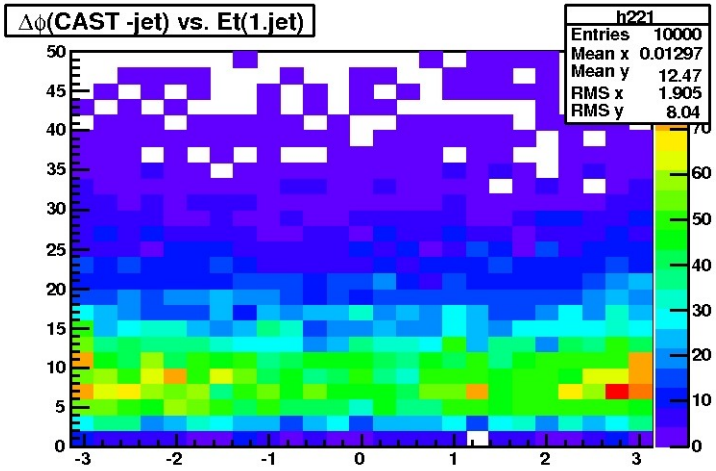
Min.Bias events without MI (almost no correlation):





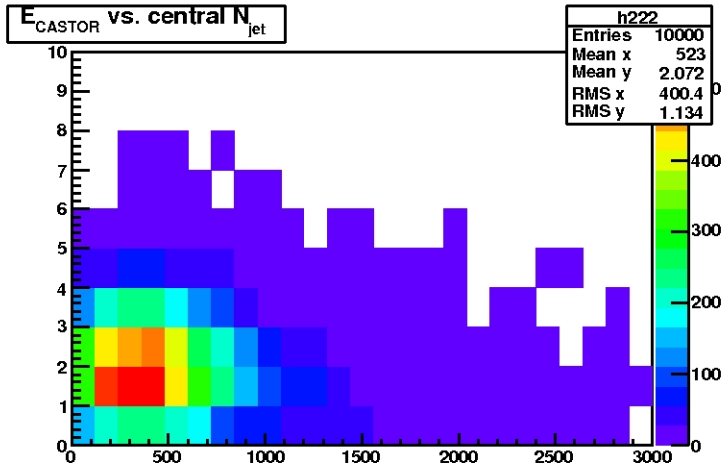
Min.Bias events with MI tune A (correlation seen):

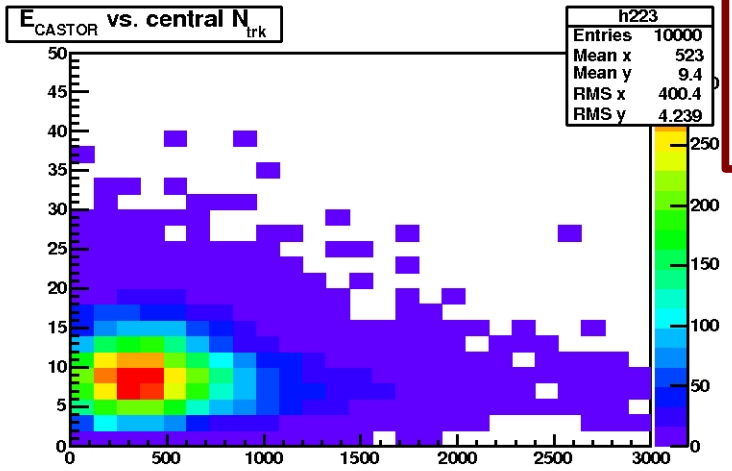




Studying Long Range Correlations

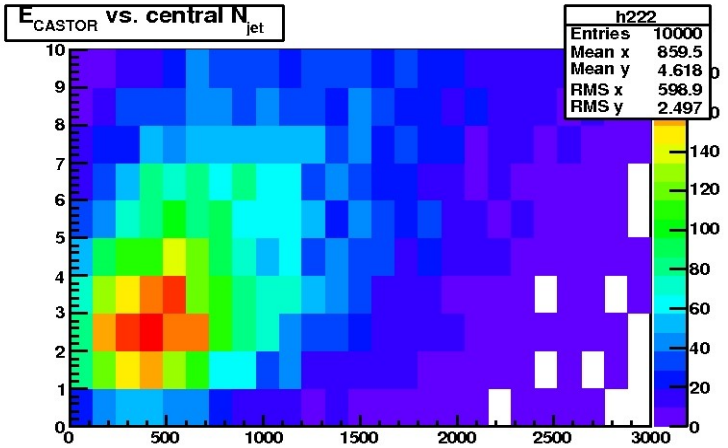
Min.Bias events without MI (almost no correlation):

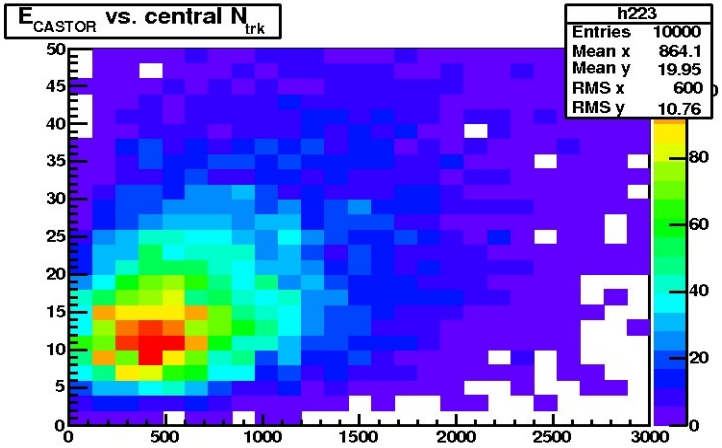




Cuts:
Et(jet)>3GeV
E(trk)> 1GeV

Min.Bias events with MI tune A (correlation seen):





Min. Bias - Correlations Summary

tune	*E(castor)*		*Et (1.jet)*		
	mean	*RMS*	*mean*	*RMS*	*corr. k.*
no MI	523	400	6.8	4.6	-0.04
A (100)	928	637	12.3	7.9	0.37
S0 (300)	935	696	14.6	8.8	0.38
S0A (303)	734	582	12.4	7.7	0.24
N0CR (304)	927	647	13.2	8.0	0.32

tune	*N(jets)*			*N(tracks)*		
	mean	*RMS*	*corr. k.*	*mean*	*RMS*	*corr. k.*
no MI	2.1	1.1	-0,08	9.4	4.2	-0.04
A (100)	4.6	2.5	0.38	20.0	10.8	0.40
S0 (300)	5.3	2.7	0.29	23.5	12.2	0.36
S0A (303)	4.8	2.7	0.24	20.9	11.6	0.28
N0CR (304)	5.1	2.7	0.34	23.2	12.2	0.38

Top - Correlations Summary

tune	*E(castor)*		*Et (1.jet)*		
	mean	*RMS*	*mean*	*RMS*	*corr. k.*
no MI	547	432	123	49	-0.01
A (100)	1148	688	128	48	003
S0 (300)	1117	727	137	49	0.00
S0A (303)	849	640	135	49	0.02
N0CR (304)	1033	671	135	49	0.00

tune	*N(jets)*			*N(tracks)*		
	mean	*RMS*	*corr. k.*	*mean*	*RMS*	*corr. k.*
no MI	6.0	1.7	0,03	56	20	0.01
A (100)	8.7	2.3	0.33	78	24	0.30
S0 (300)	10.1	2.5	0.35	93	27	0.31
S0A (303)	9.0	2.4	0.26	84	26	0.20
N0CR (304)	9.6	2.6	0.32	90	27	0.26

Open Issues

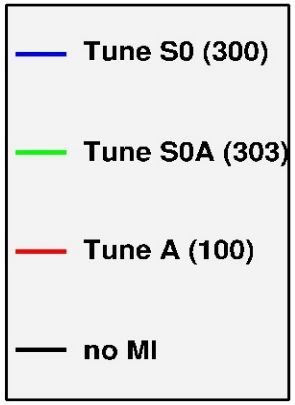
- What is called Min.Bias is indeed MSEL=1 (hard QCD processes)
  - Should be switched to MSEL=2 (hard QCD +single and double diffraction + elastic scat.)

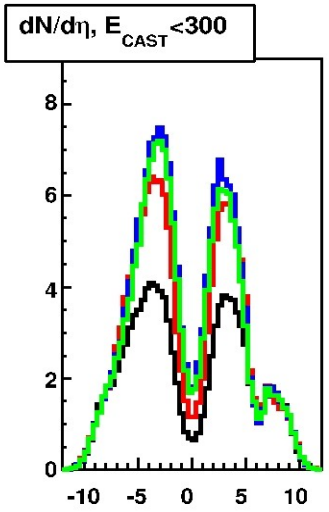
- What should be the main message if this study for HERA-LHC workshop?

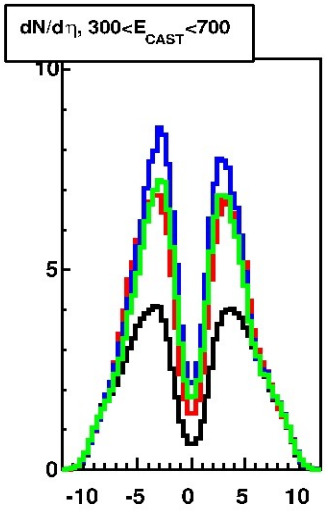
Backup

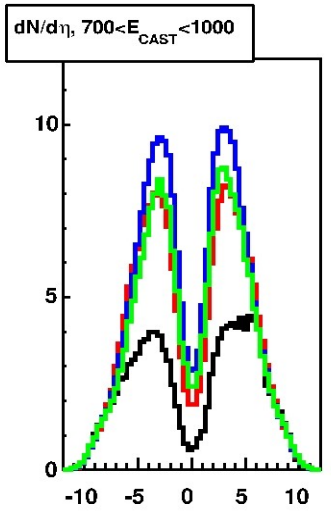
Ch. Particle Multiplicities

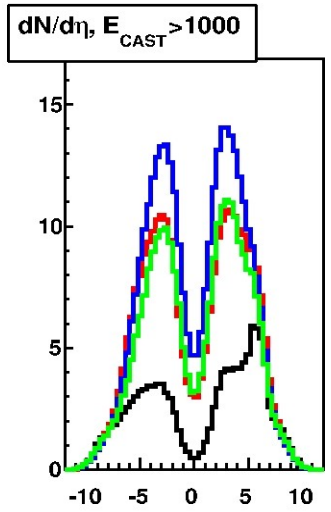
Min Bias:



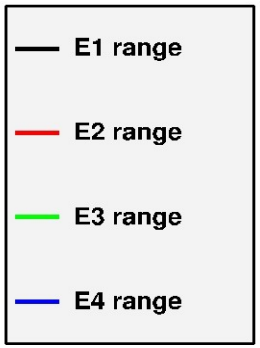


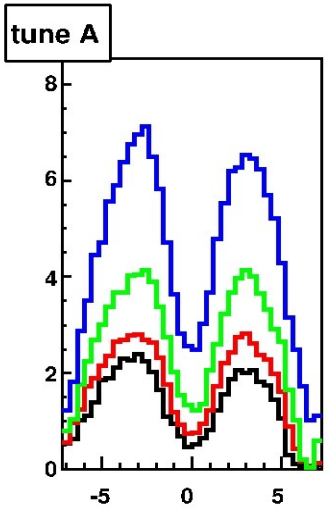


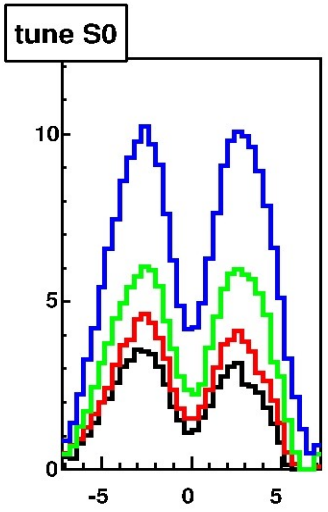


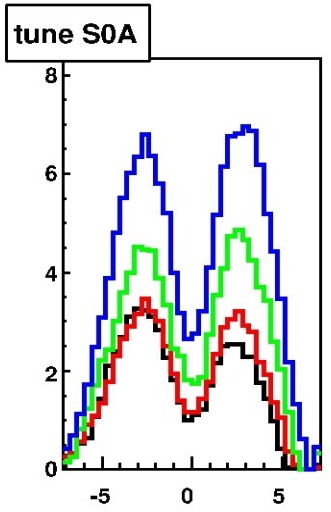


MI - noMI:



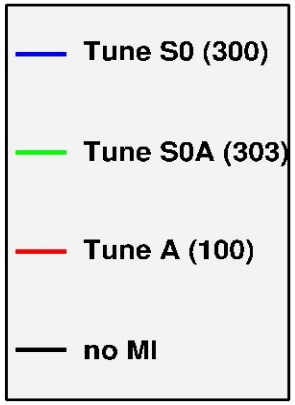


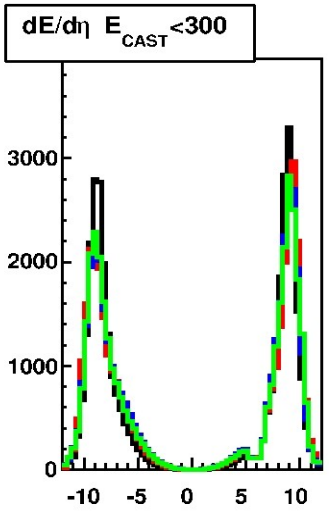


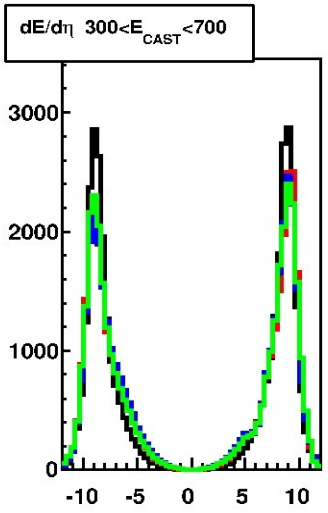


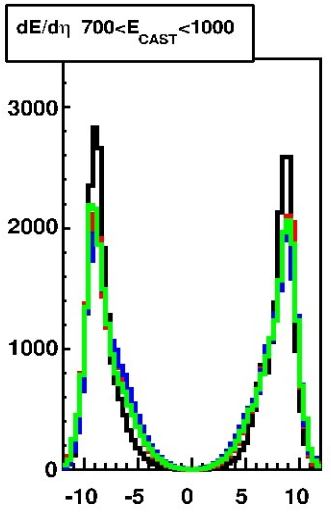
Particle Energy Flow

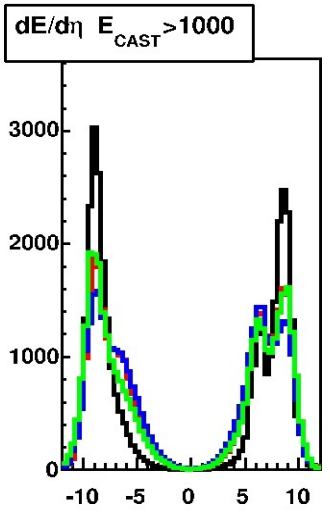
Min Bias:











MI - noMI: