Fastsim validation (high p_T jets)

- Compared FastSim (223_V11_v1) vs FullSim (221_V9_v1)
- Looked into 3 different pthat ranges:
  - Low: 50-80
  - Medium: 170-230
  - High: 3000-3500
- Looked into different Algorithms:
  - SisCone 7, SisCone5, Kt6, Kt4, IC5

In the following plots:

FastSim - RedLine

FullSim - BlackLine

Suvadeep Bose (TIFR/LPC)

Samples used for comparisons:

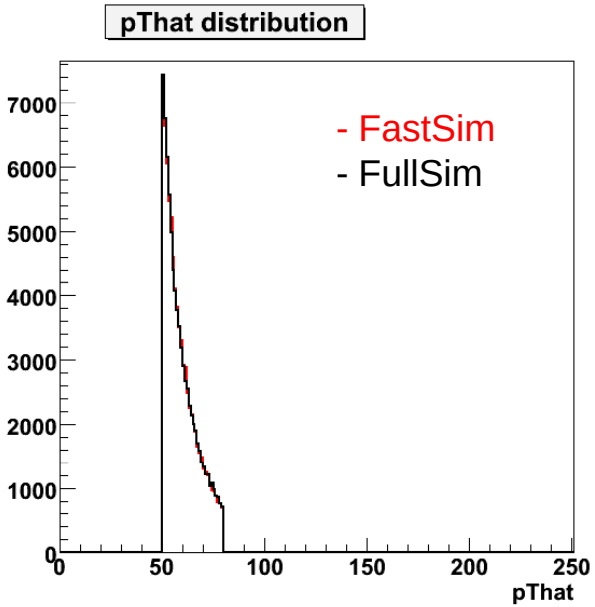
/RelValQCD_Pt_50_80/CMSSW_2_2_3_IDEAL_V11_FastSim_v3/GEN-SIM-DIGI-RECO
/RelValQCD_Pt_170_230/CMSSW_2_2_3_IDEAL_V11_FastSim_v3/GEN-SIM-DIGI-RECO
/RelValQCD_Pt_3000_3500/CMSSW_2_2_3_IDEAL_V11_FastSim_v3/GEN-SIM-DIGI-RECO

/RelValQCD_Pt_50_80/CMSSW_2_2_1_IDEAL_V9_v1/GEN-SIM-RECO
/RelValQCD_Pt_170_230/CMSSW_2_2_1_IDEAL_V9_v1/GEN-SIM-RECO
/RelValQCD_Pt_3000_3500/CMSSW_2_2_1_IDEAL_V9_v1/GEN-SIM-RECO

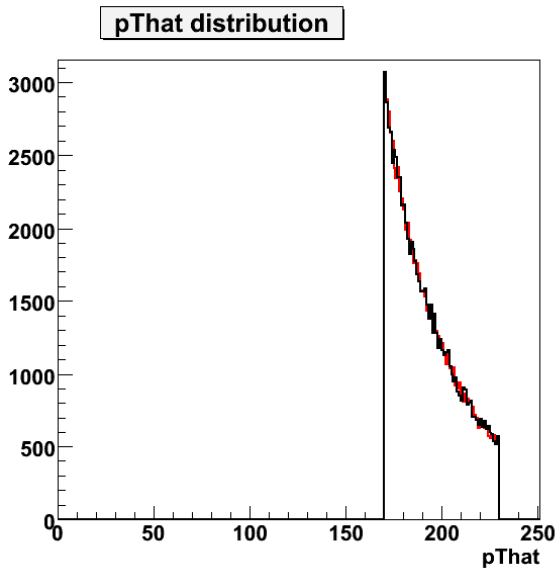
- We looked at the following quantities (for Genjet and Calojet):
- Jet multiplicities
- First four leading jet eta distributions
- Inclusive Pt spectra
- Response plots
- First four leading jet energies
- Basic resolution parameters

- Cross checking pthat bin – whether correct cuts were applied as *genEventScale.*

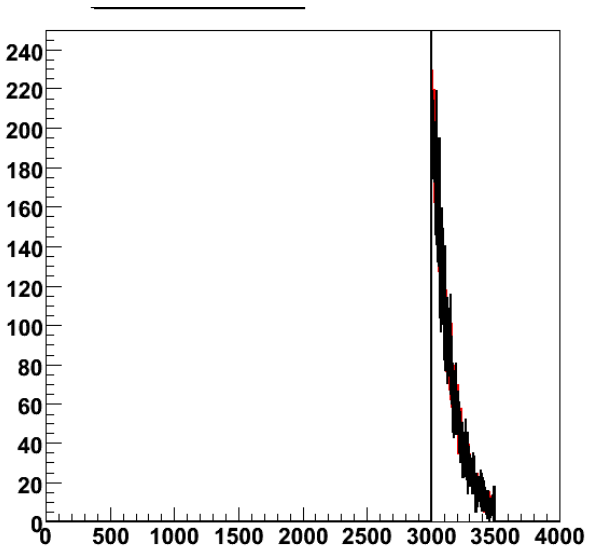
50-80 pthat bin



170-230 pthat bin



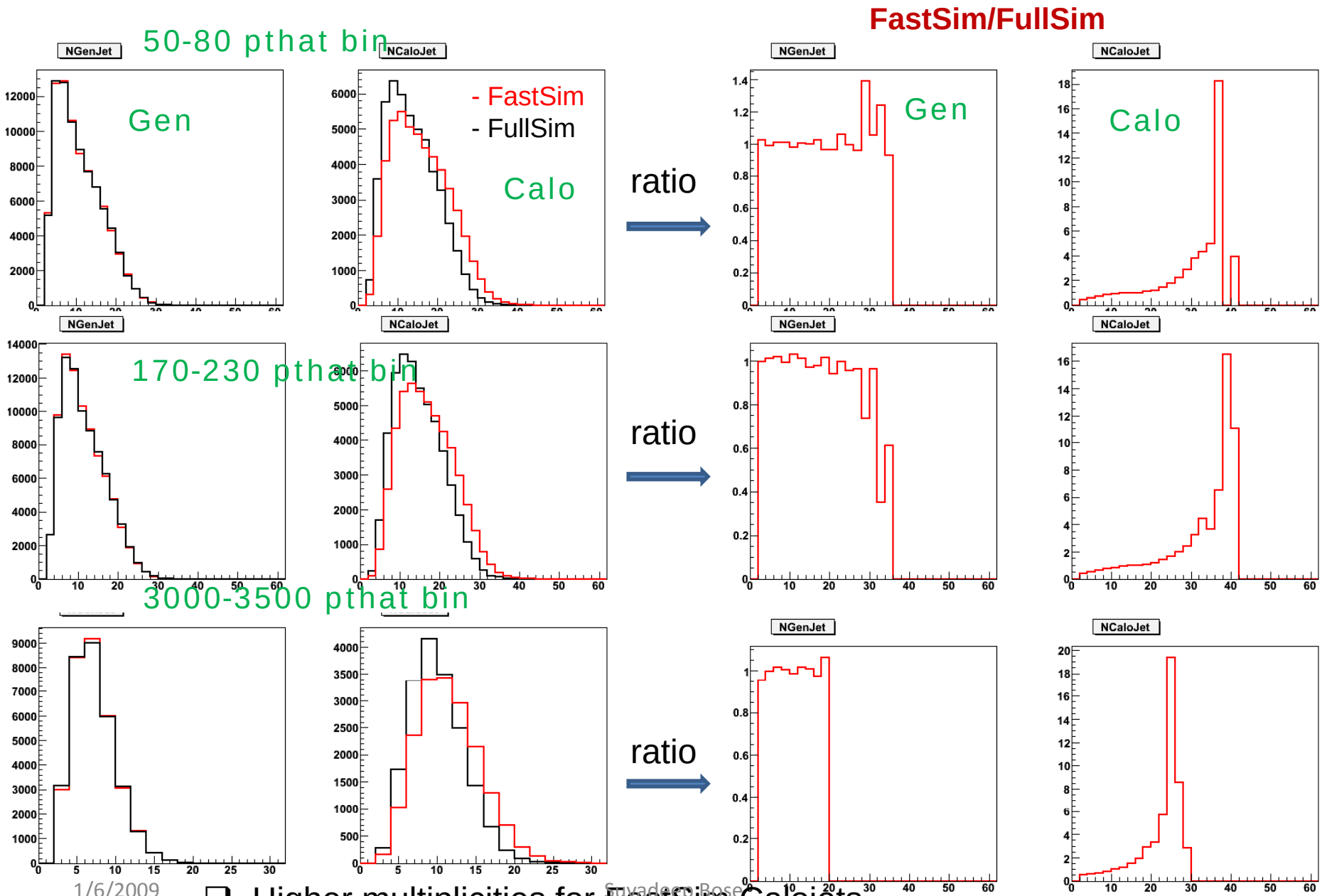
3000-3500 pthat bin



- *Only comparison plots for SisCone7 will be presented.*

- *For details please see:*
http://home.fnal.gov/~sbose/Validation/Fast223VsFull221

Jet Multiplicity – Gen and Calo : Low, Medium and High pthat bins

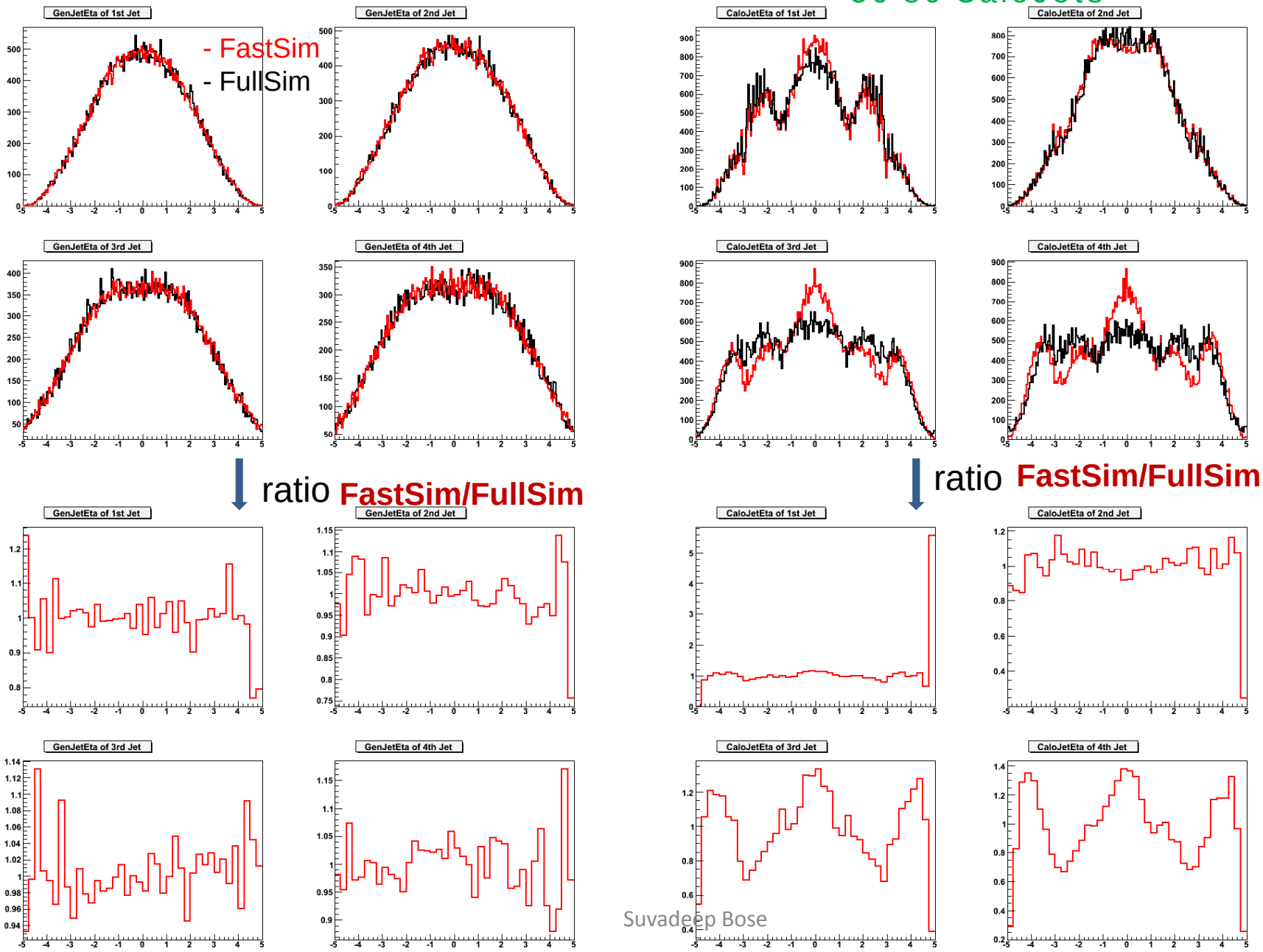


- Higher multiplicities for FastSim Calojets

First four Leading jet Eta distributions – Gen and Calo

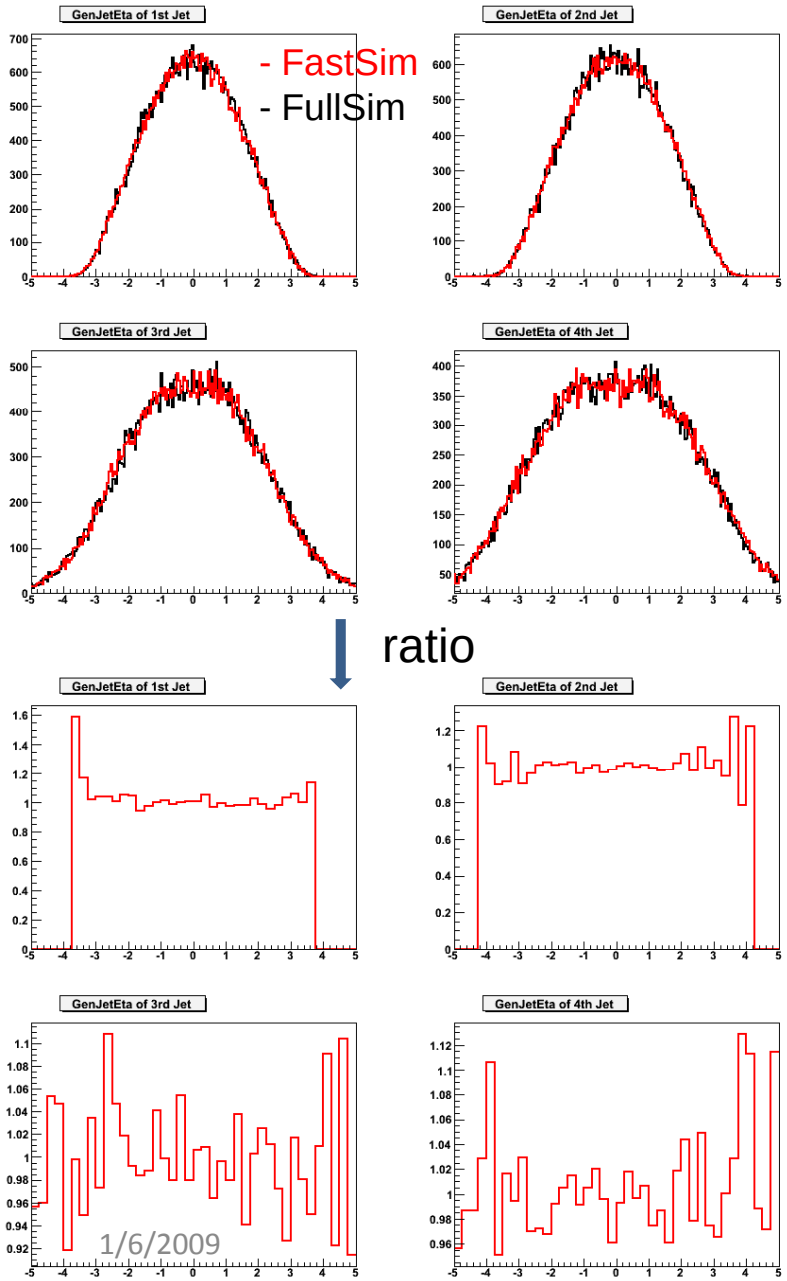
50-80 GenJets

50-80 CaloJets

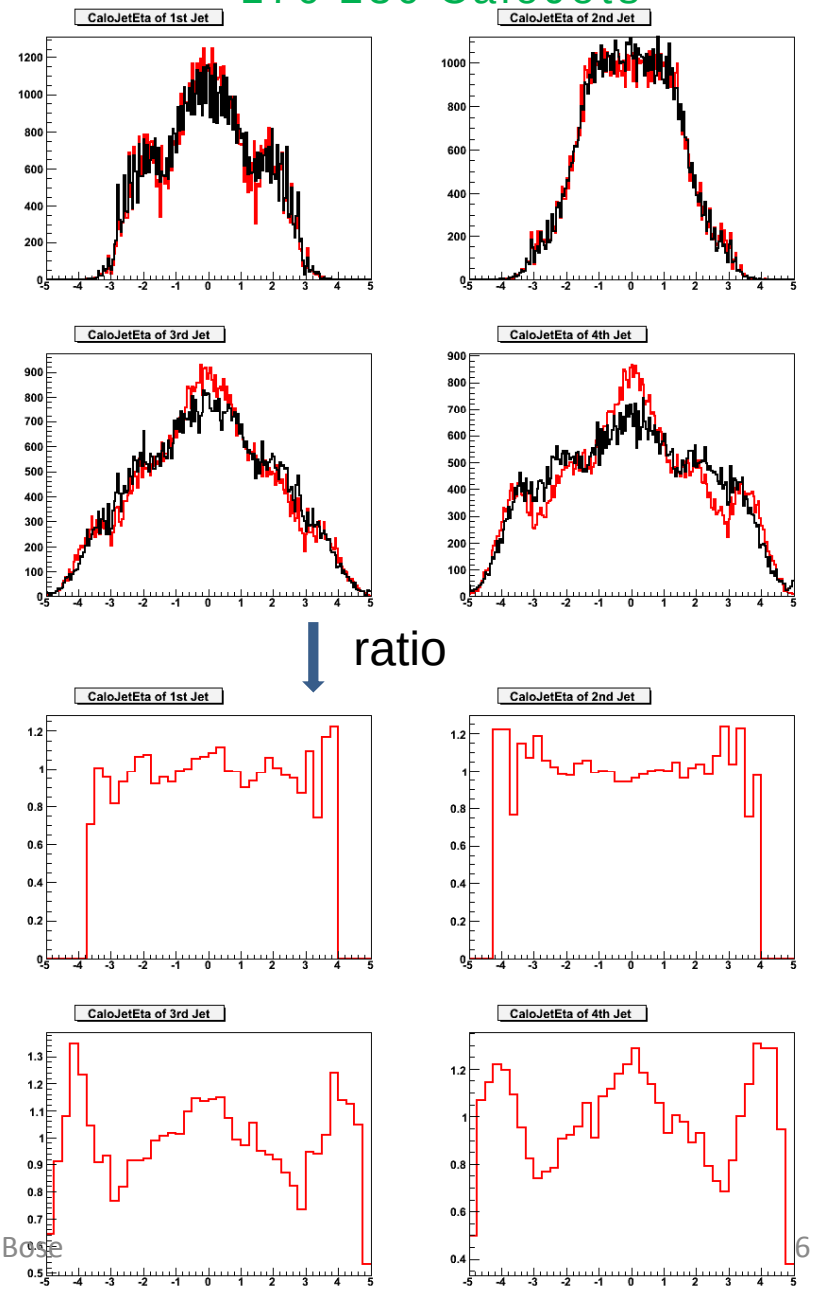


First four Leading jet Eta distributions – Gen and Calo

170-230 GenJets



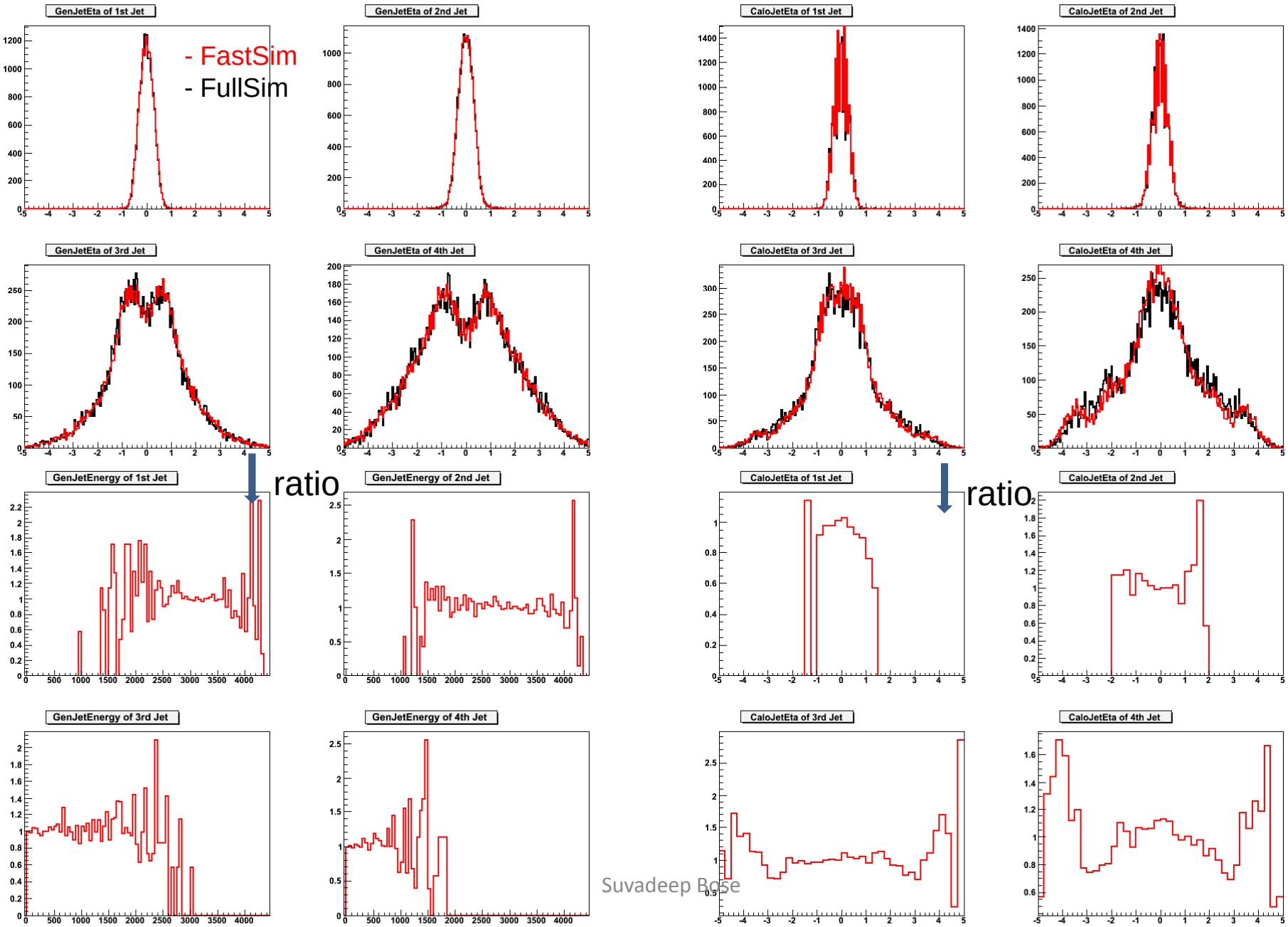
170-230 CaloJets



First four Leading jet Eta distributions – Gen and Calo

3000-3500 GenJets

3000-3500 CaloJets



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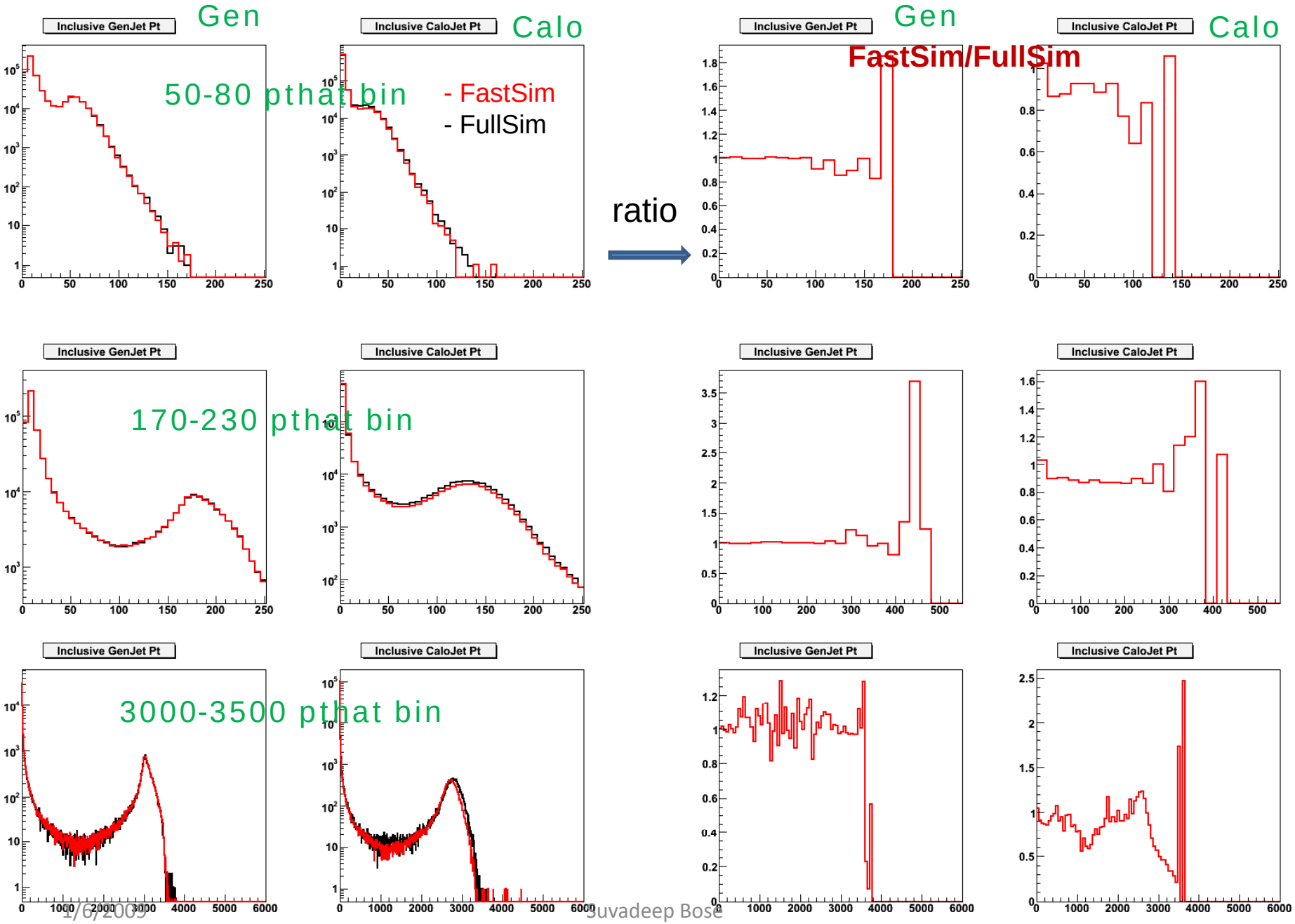
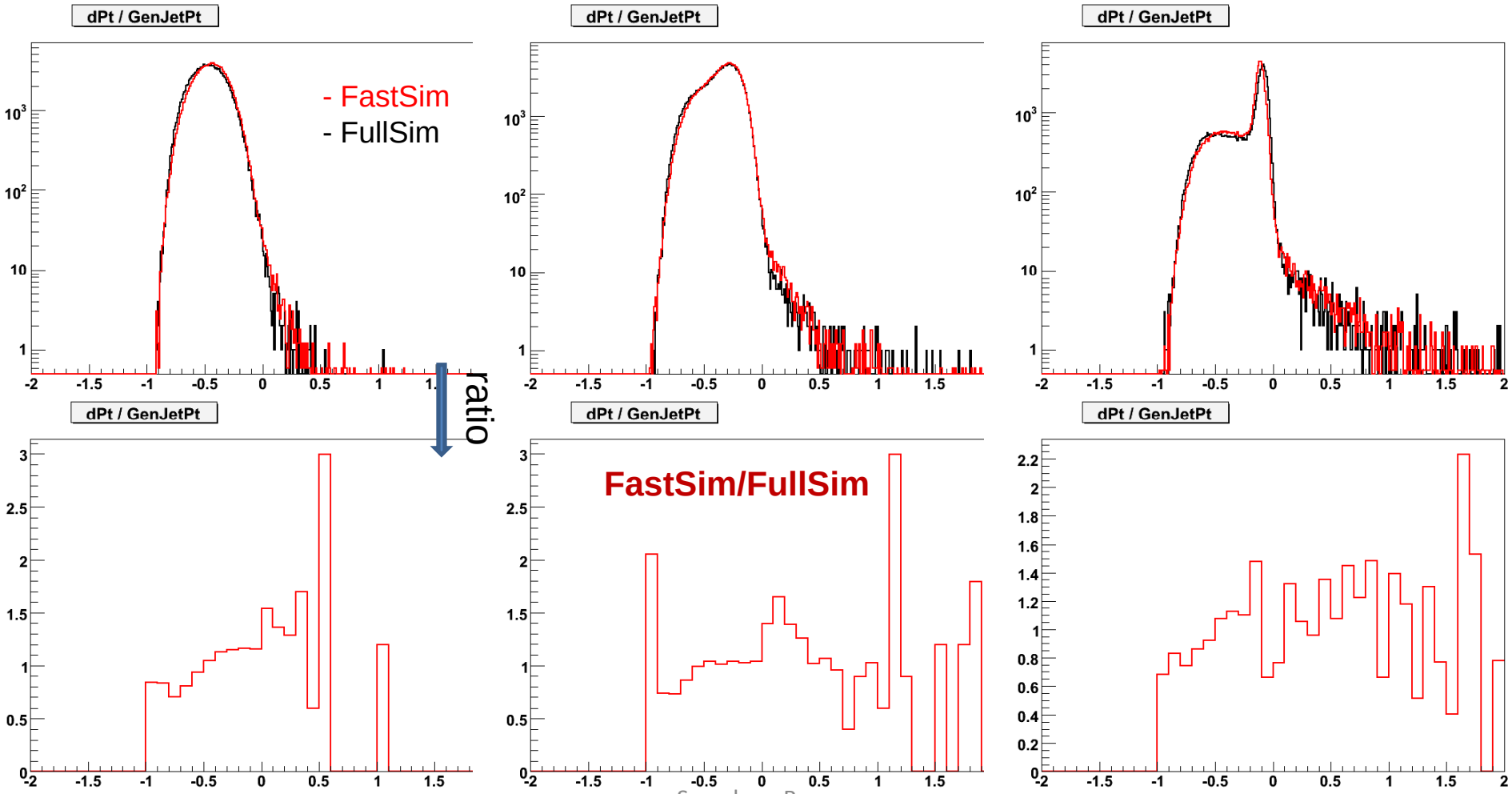
Inclusive Jet Pt distribution – Gen and Calo



Response plots – dPt/GenPt distributions

dPt = CaloJetPt – GenJetPt
Matching radius = 0.25, CaloJetPt threshold = 5

50-80 pthat bin | 170-230 pthat bin | 3000-3500 pthat bin



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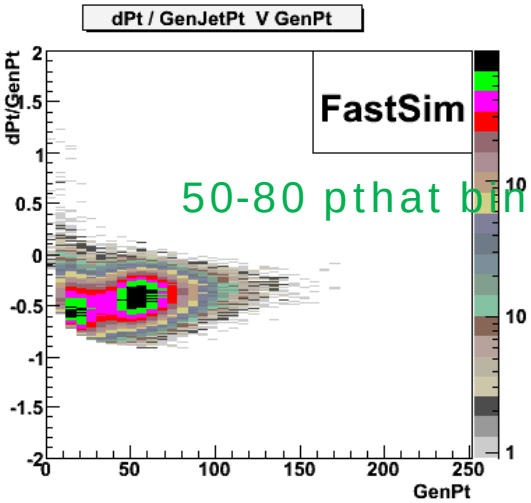
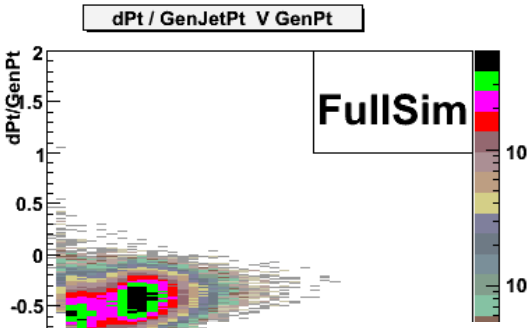
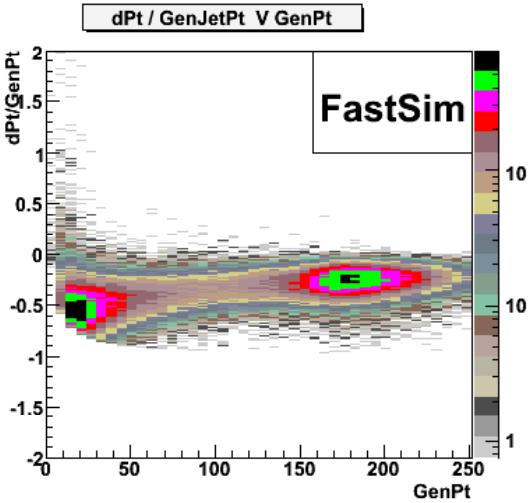
Response plots – dPt/GenPt distributions

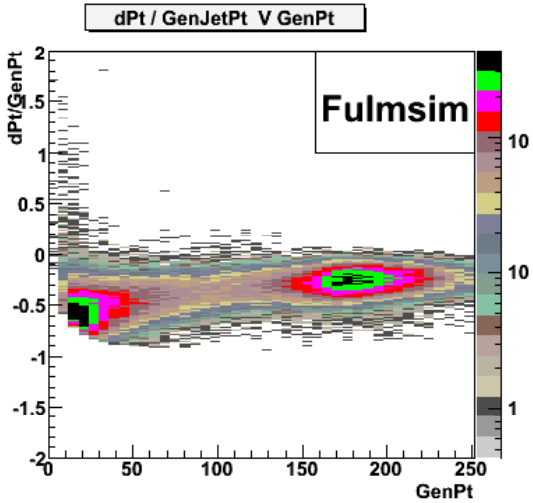


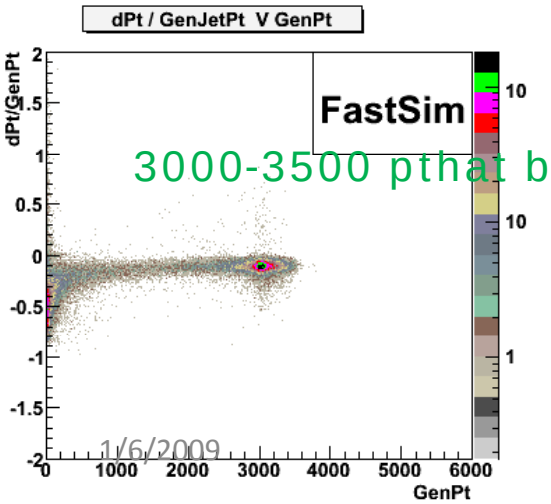
50-80 pthat bin



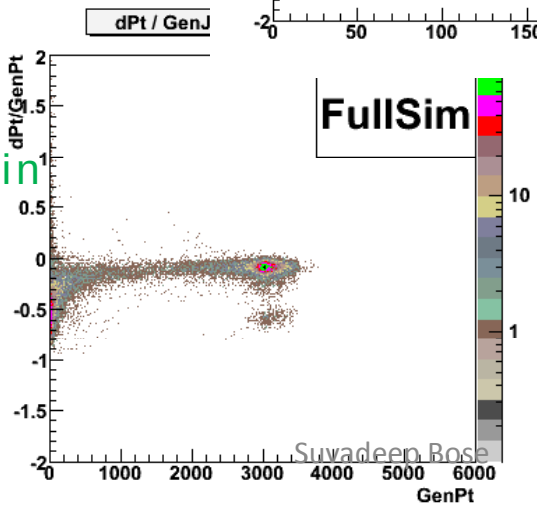
170-230 pthat bin







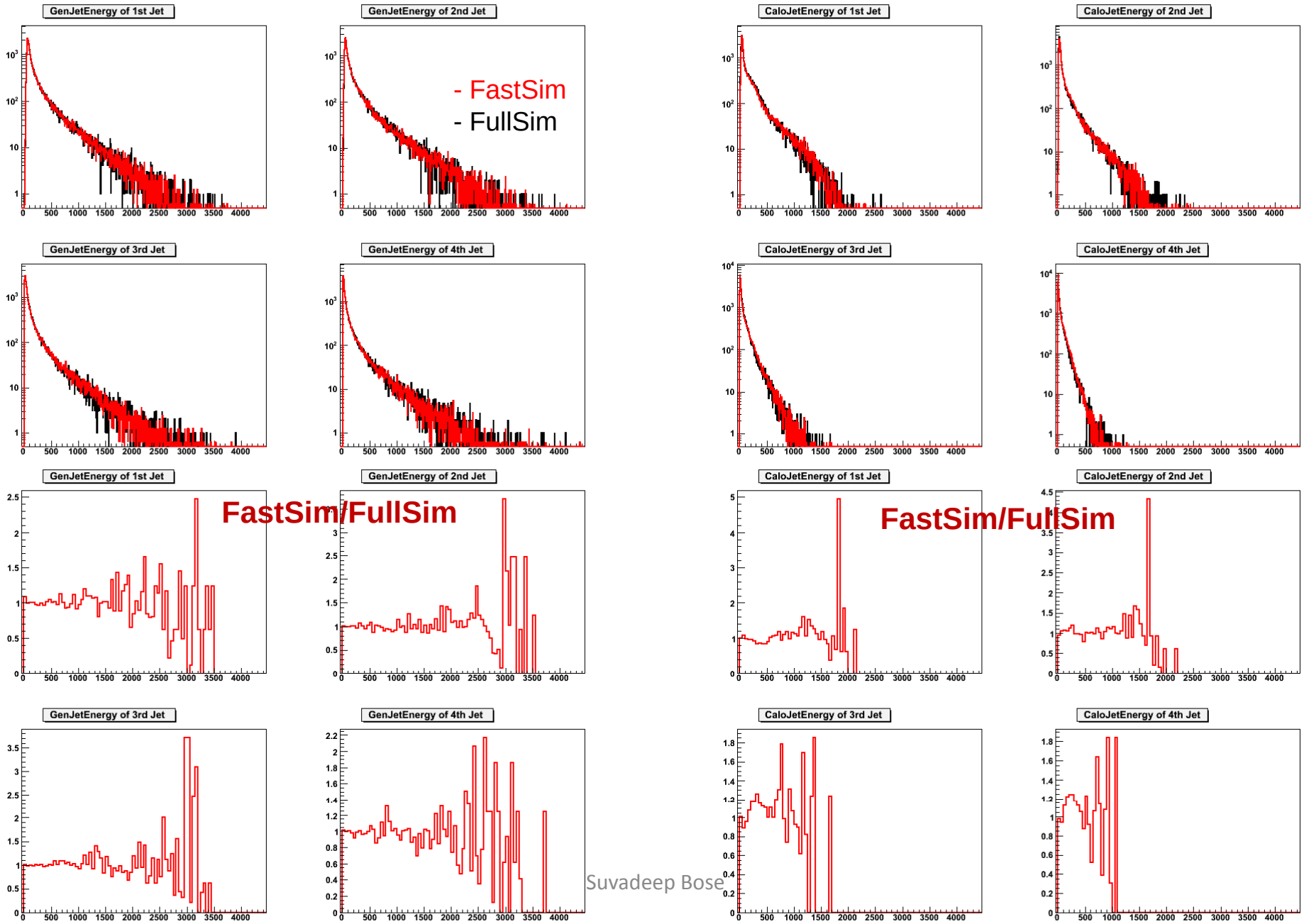
3000-3500 pthat bin



Leading jet Energy distribution – Gen and Calo : Low pthat bins

50-80 GenJets

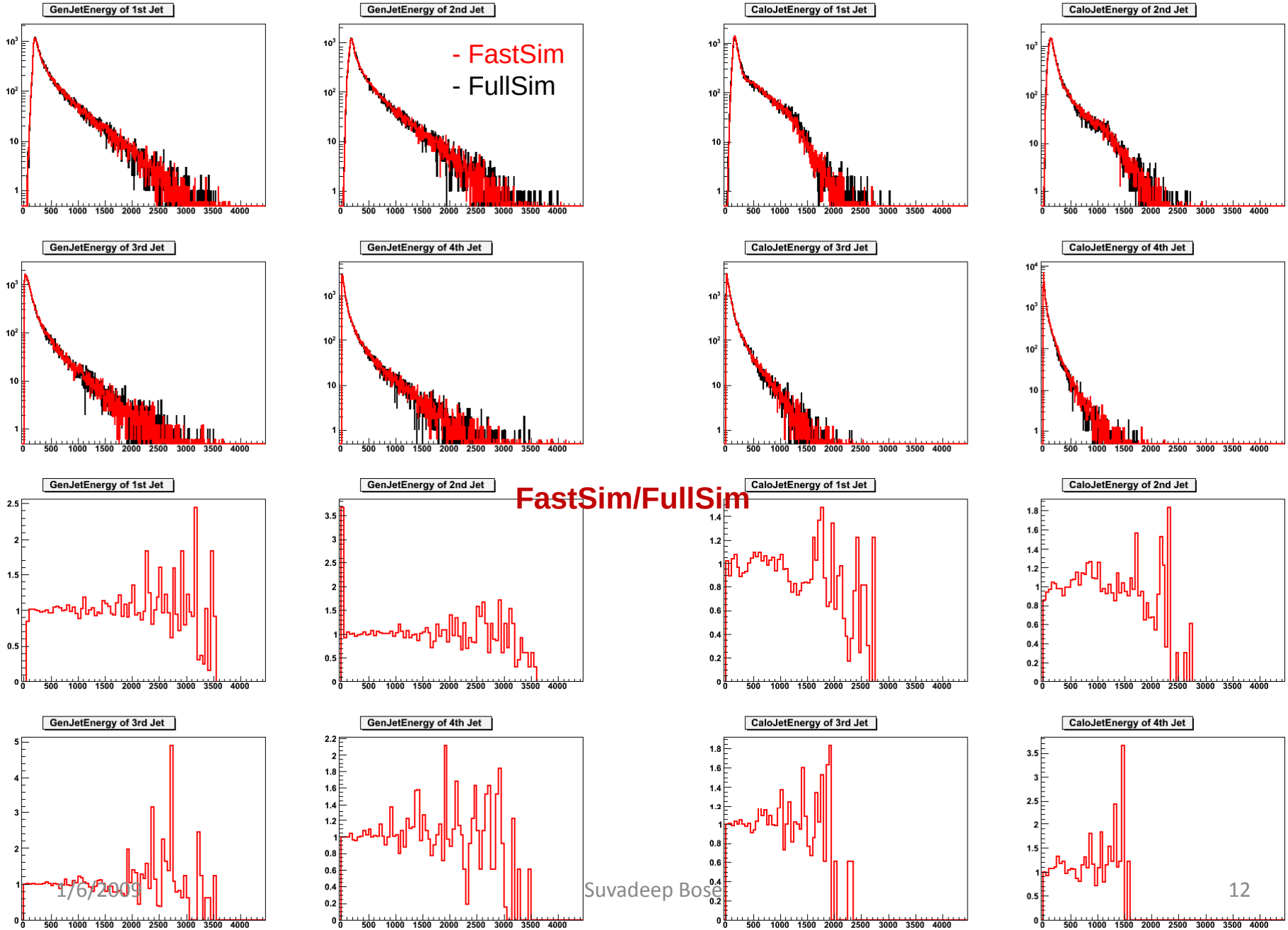
50-80 CaloJets



Leading jet Energy distribution – Gen and Calo : Medium pthat bins

170-230 GenJets

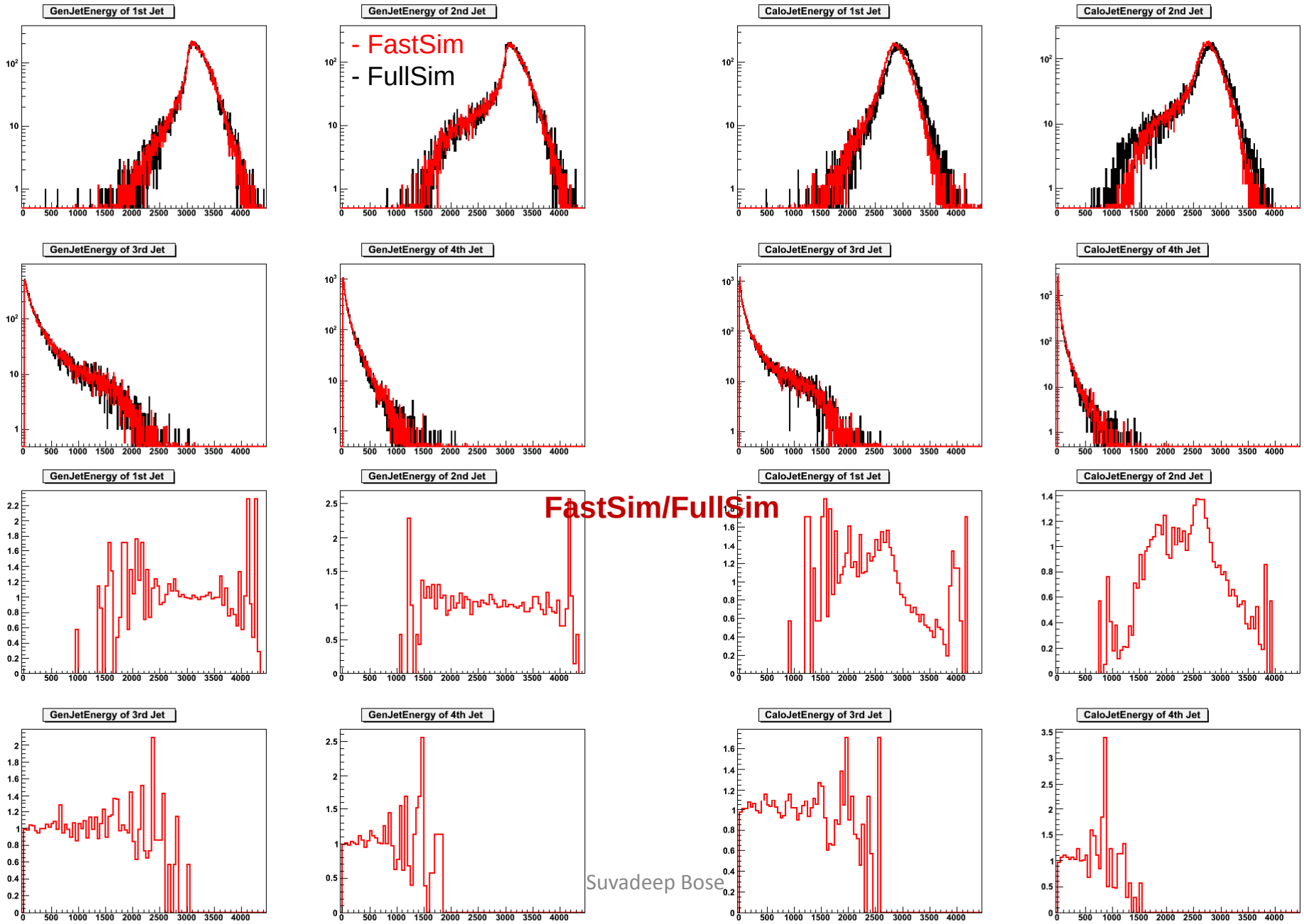
170-230 CaloJets



Leading jet Energy distributions – Gen and Calo : High pthat bins

3000-3500 GenJets

3000-3500 CaloJets



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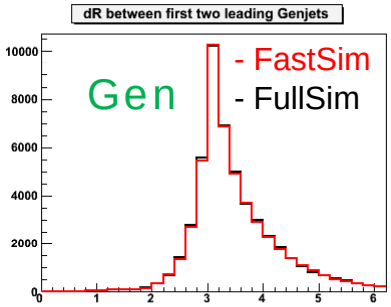
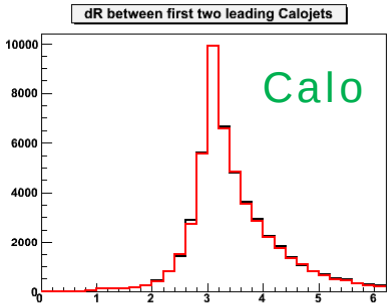
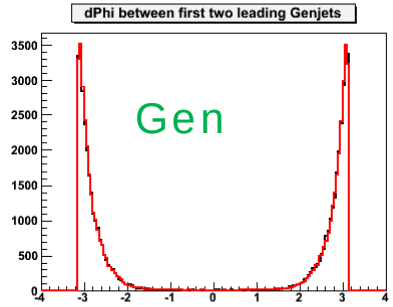
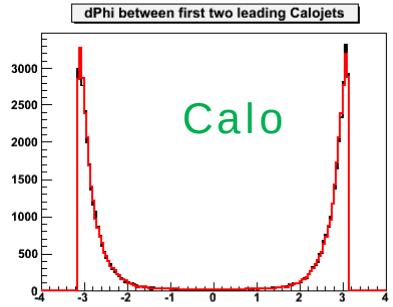
dR and dPhi distributions

50-80 pthat bin





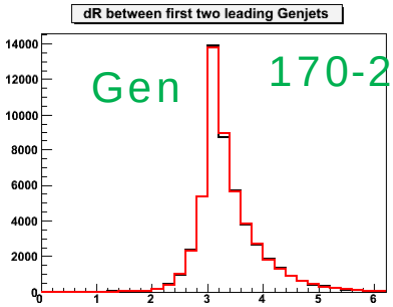




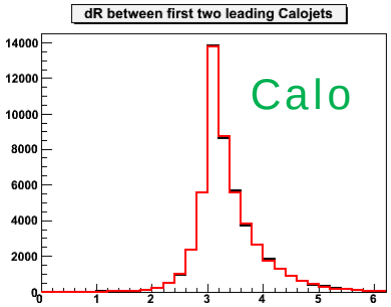
$$dR = \sqrt{(\eta_1 - \eta_2)^2 + (\phi_1 - \phi_2)^2}$$

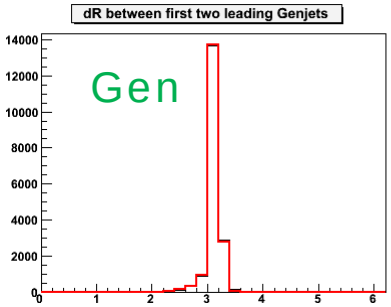
$$d\phi = (\phi_1 - \phi_2)$$

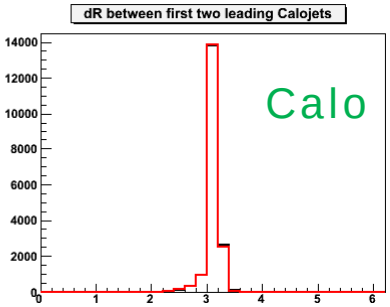
3000-3500 pthat bin

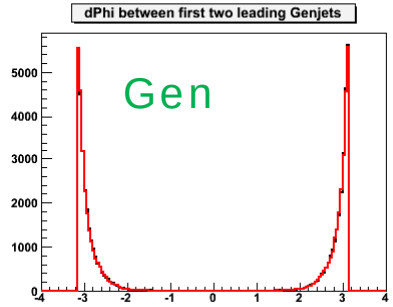


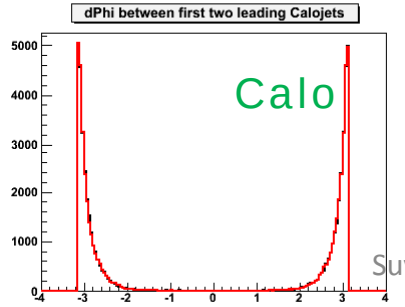
170-230

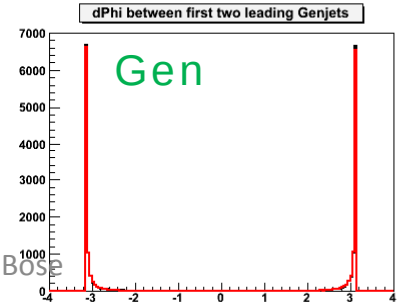


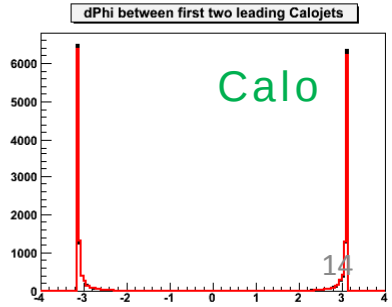












Observations

- Good matching in fullsim and fastsim in pT distributions (individual pT as well as inclusive pT). dPt/GenPt plot enforces that conclusion.
- Mismatch between fastsim and fullsim eta distribution at detector levels – prominent in lesser energy jets (3rd,4th) .
- Multiplicity of calojets higher in fastsim.
- Calorimetric jet energies differ in fastsim and fullsim more in the higher pthat ranges, i.e. for higher momentum jets.
- The dR and dPhi plots suggest that the basic resolutions are okay in the fastsim.