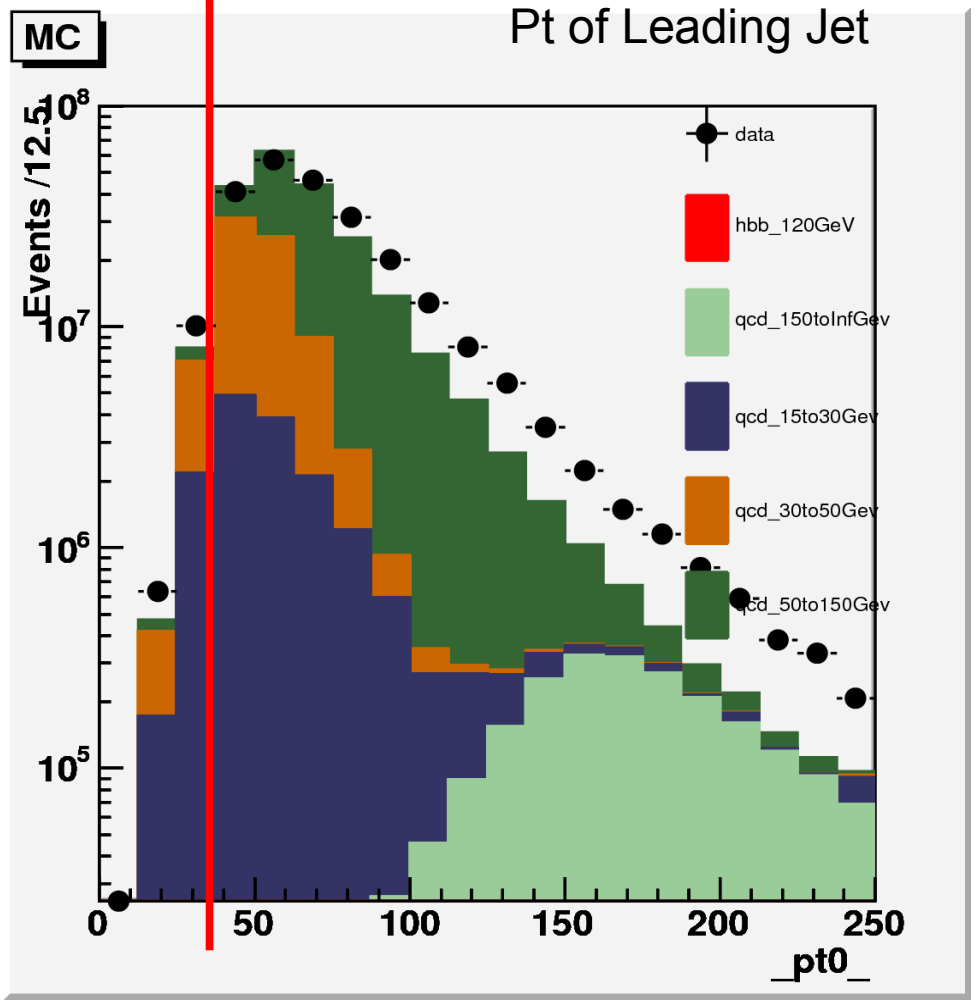
Kinematic distributions for 501pb^-1

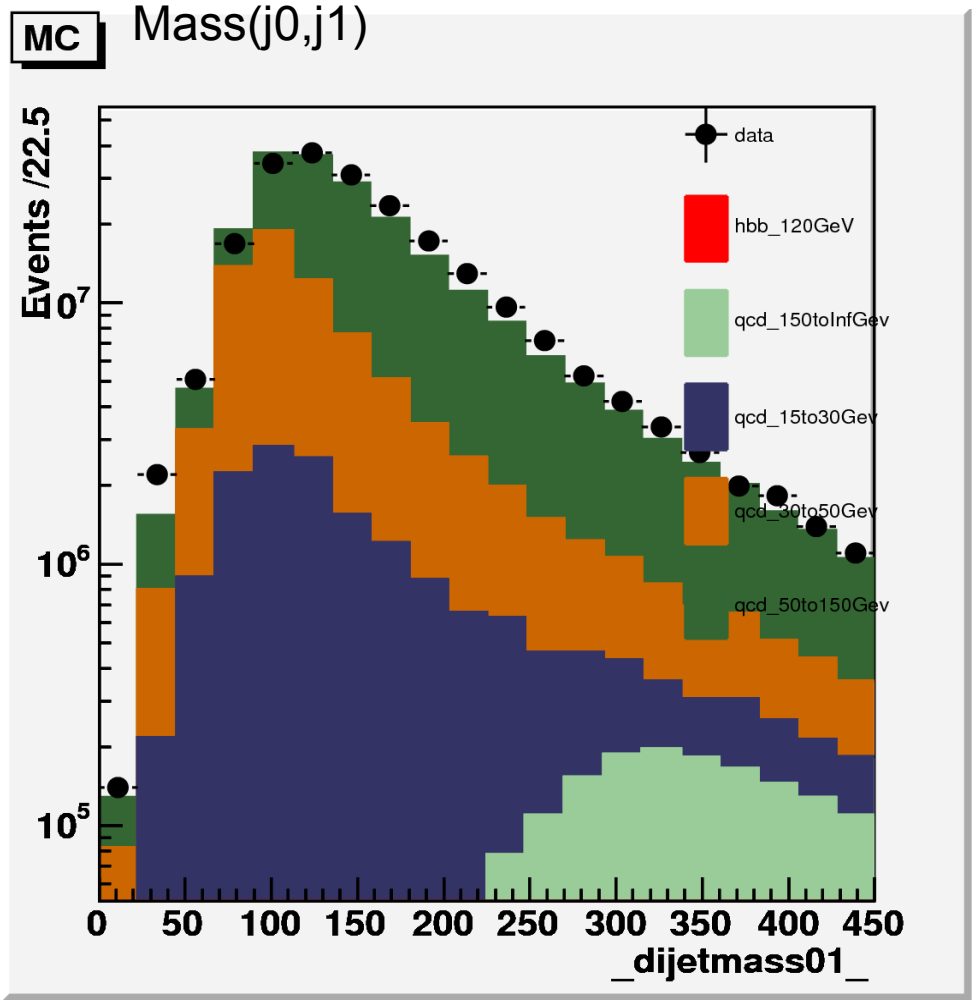
- /store/user/rmankel/SUSYBBHToBB_M-120V8/merged/
- /store/user/rmankel/QCD_Pt-15to30_bEnrichedV8/merged/
- /store/user/rmankel/QCD_Pt-30to50_bEnrichedV8/merged/
- /store/user/rmankel/QCD_Pt-50to150_bEnrichedV8/merged/
- /store/user/rmankel/QCD_Pt-150_bEnrichedV8/merged/
- /store/user/rmankel/MultiJetV8/merged/ (data)

- All histograms are scaled by lumiData/IntLumiMC taken from Rainer's presentation. Signal sample were scaled by 0.051 (IntLumiHbb=9823pb^-1)

no cuts

'data' triggered. trgAccept bit was considered





Fermilab-Pub-10-446-E

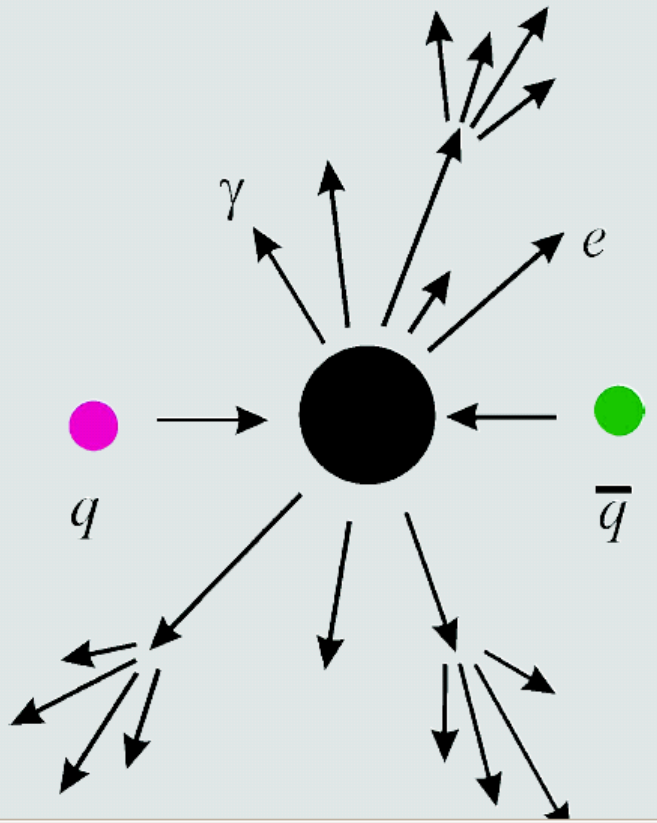
Search for neutral Higgs bosons in the multi-b-jet topology in 5.2 fb^{-1} of $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV

V.M. Abazov,[35] B. Abbott,[72] B.S. Acharya,[29] M. Adams,[48] T. Adams,[46] G.D. Alexeev,[35] G. Alkhazov,[39] A. Alton[a],[60] G. Alverson,[59] G.A. Alves,[2] L.S. Ancu,[34] M. Aoki,[47] Y. Arnoud,[14] M. Arov,[57] A. Askew,[46] B. Åsman,[40] O. Atramentov,[64] C. Avila,[8] J. BackusMayes,[79] F. Badaud,[13] L. Bagby,[47] B. Baldin,[47] D.V. Bandurin,[46] S. Banerjee,[29] E. Barberis,[59] P. Baringer,[55] J. Barreto,[2] J.F. Bartlett,[47] U. Bassler,[18] V. Bazterra,[48] S. Beale,[6] A. Bean,[55] M. Begalli,[3] M. Begel,[70] C. Belanger-Champagne,[40] L. Bellantoni,[47] S.B. Beri,[27] G. Bernardi,[17] R. Bernhard,[22] I. Bertram,[41] M. Besançon,[18] R. Beuselinck,[42] V.A. Bezzubov,[38] P.C. Bhat,[47] V. Bhatnagar,[27] G. Blazey,[49] S. Blessing,[46] K. Bloom,[63] A. Boehnlein,[47] D. Boline,[69] T.A. Bolton,[56] E.E. Boos,[37] G. Borissov,[41]

Six variables for which the data distributions are well modeled by the simulation are used to separate the jet pair from a Higgs boson from the background: $\Delta\eta$ between the two jets in the pair, $\Delta\phi$ between the two jets in the pair, the angle between the leading jet in the pair and the total momentum of the pair, the momentum balance in the pair [22], the combined rapidity of the pair, and the event sphericity. Based on these kinematic variables a likelihood discriminant, $\mathcal{D}$, is calculated according to:

- All variables are understood except pt balance & sphericity
- http://www.kip.uni-heidelberg.de/~ion/talks/EventShapeVariables.pdf

Sphericity



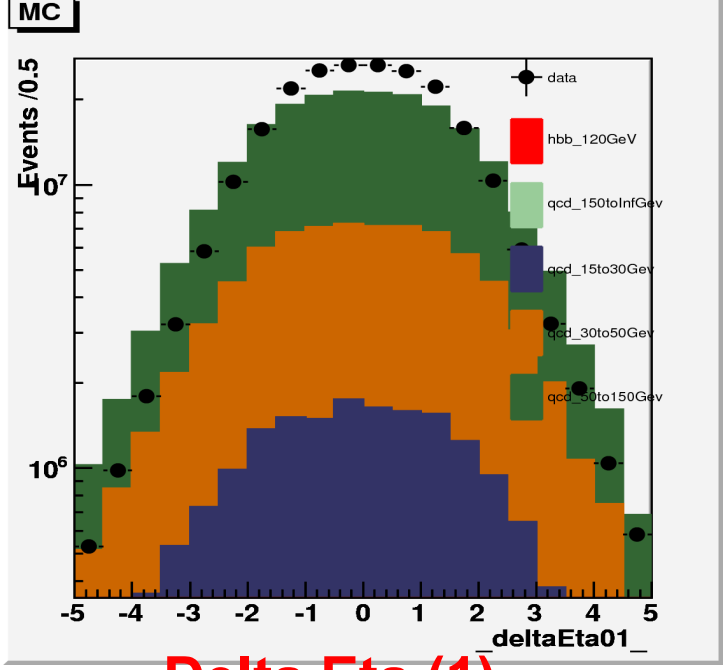
- Sphericity tensor

$$S^{\alpha\beta} = \frac{\sum_i p_i^{\alpha} p_i^{\beta}}{\sum_i |\boldsymbol{p}_i|^2}$$

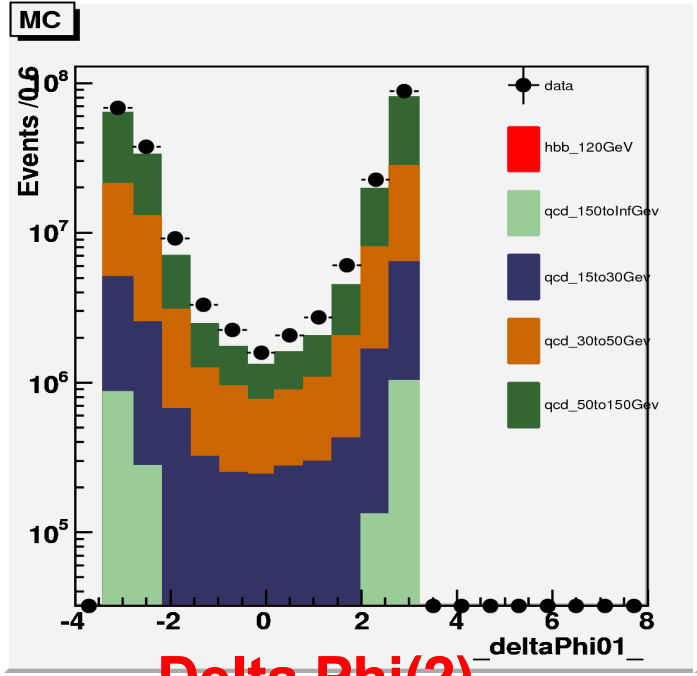
- Eigenvalues $\lambda_1 \geq \lambda_2 \geq \lambda_3$ with $\lambda_1 + \lambda_2 + \lambda_3 = 1$
- Sphericity $S = \frac{3}{2}(\lambda_2 + \lambda_3)$ with $0 \leq S \leq 1$
- 2-jet event: $S \approx 0$ isotropic event: $S \approx 1$

[22] The momentum balance is defined as $|p_{b_1} - p_{b_2}|/|p_{b_1} + p_{b_2}|$, where p_{b_i} is the magnitude of the momentum three vector of the ith b-quark jet.

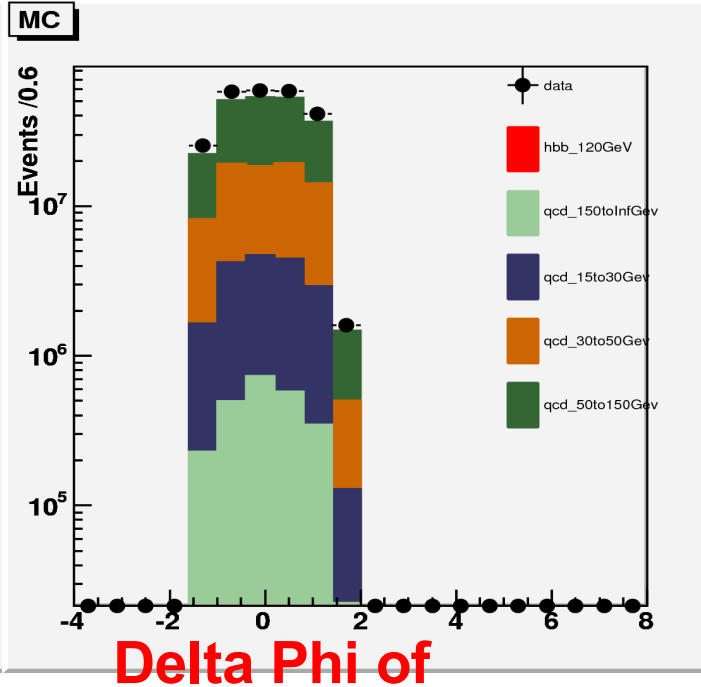
- How can we calculate sphericity?
- Look here
  - http://root.cern.ch/root/roottalk/roottalk01/4084.html
  - ftp://ftp.slac.stanford.edu/groups/lcd/Physics_tool
  - EventShape.h EventShape.cxx



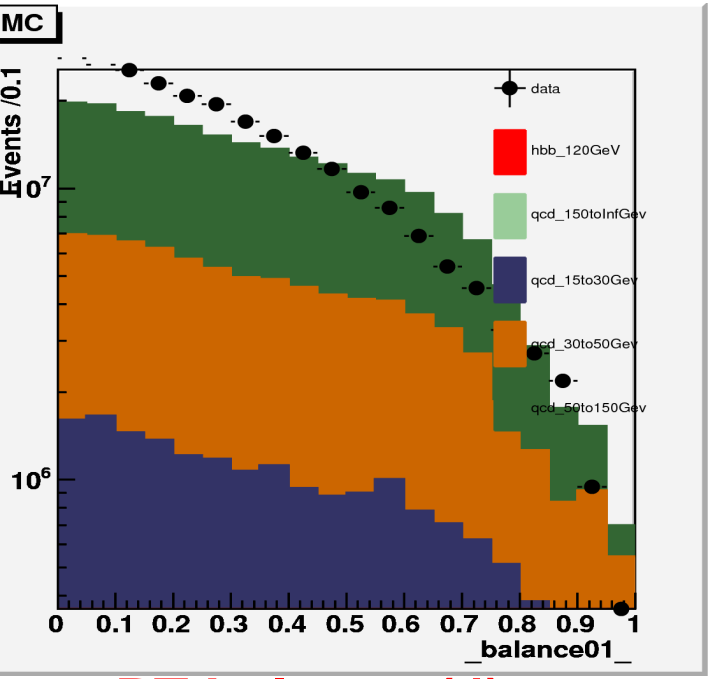
Delta Eta (1)



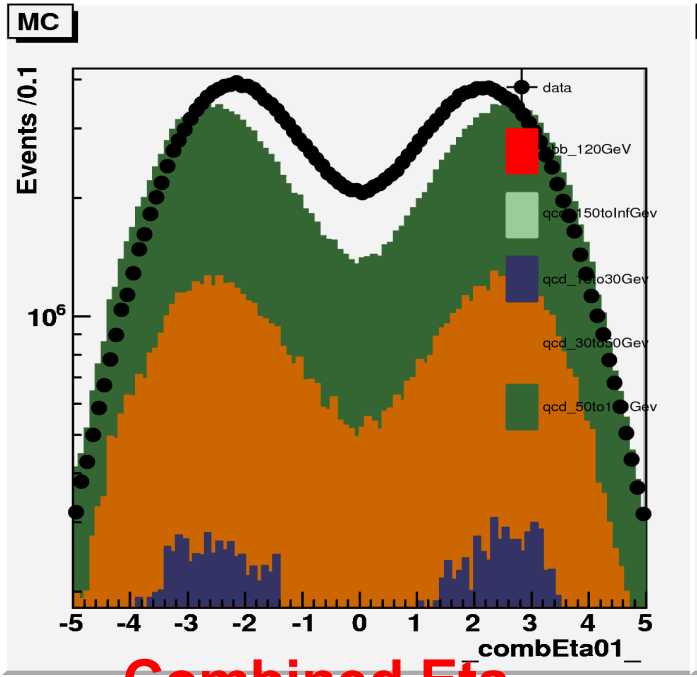
Delta Phi(2)



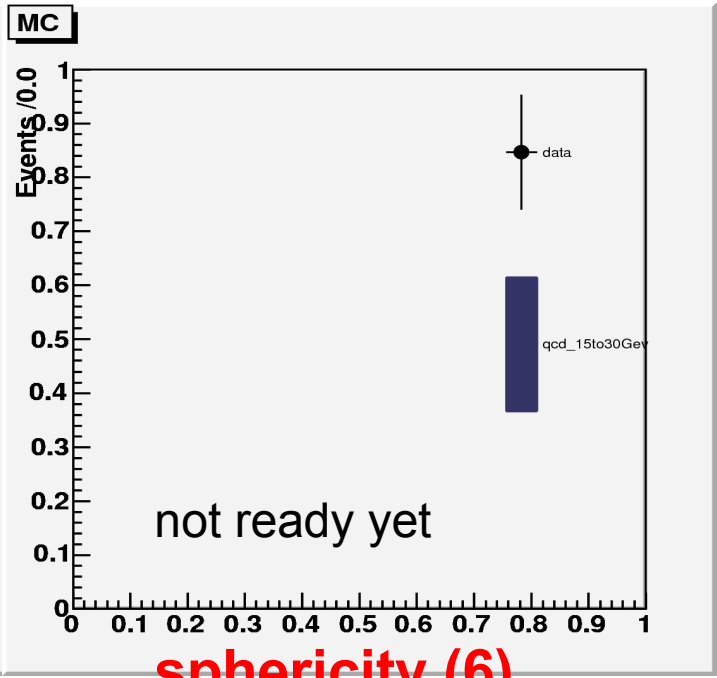
Delta Phi of leading jet (3)



PT balance (4)



Combined Eta of the pair (5)



sphericity (6)

Questions && Plans

- 'Data' histo were scaled by 100
  - Why? I expected the scale factor <10
  - Bug in the tselector code?
  - Bug in the plotter?
  - I found technical problems with EventShape.h EventShape.cxx -- 'nan' values sometimes
  - I can provide code of D0-variables definition to somebody for cross check.