HIGGS SELF-COUPLING ANALYSIS WITH H→WW*

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STATUS

- Vertex finding
  - Using nnH sample
  - Check using b jets & c jets in more simple situation
  - Compare Nominal & AVF+BNess algorithm
  - check BNess tagger fake track rejection bias(ongoing)

- Study for jet clustering
  - Study jet structure
  - Trying to distinguish quark & gluon jets
  - Trying to use color dipole based jet clustering
  - Just start trial
  - So far, no improvement can be obtained…

VERTEX FINDING OF CJETS

- Common parameters are set at same values for comparison

- Same event sample(nnH sample) 99432 events
  - H→cc: 6461 events

- 2 jet clustering, jet matching with MCtruth is performed

method	cjet with 2vtx	cjet with 1+1vtx	cjet with 1vtx	total
Nominal Algorithm	43	165	6537	6745
AVF&BNess	84	215	6960	7259

  - Total: ～7% increased

- Vertex mis-ID eff. is increased(but, 2vtx jet has pure vertices)
  - Though num. of vertices is small
  - →need additional selection for singletrk? (e.g.)vertex mass?)

method	cjet with 2vtx	cjet with 1+1vtx	cjet with 1vtx
Nominal Algorithm	0.00±0.00	0.012±0.006	0.0014±0.004
AVF&BNess	0.00±0.00	0.018±0.007	0.0013±0.004

VERTEX FINDING OF BJETS IN SIMPLE SITUATION

- Common parameters are set at same values for comparison
- Same event sample(nnH sample) 99432 events
  - H→bb: 55474 events
- 2 jet clustering, jet matching with MCtruth is performed
- Num. of vertices

method	bjet with 2vtx	bjet with 1+1vtx	bjet with 1vtx	total
Nominal Algorithm	28215	24049	35616	87880
AVF&BNess	36841	17755	36588	91184

- This case, Total: ∼4% increased
- Jets with 2vtx are drastically increased(~26%): move from 1+1
- Jets with 1vtx slightly increased

- Fake rate per vtx: in this case, a little worse(need opt.)
  - Due to single trk vertices? →under investigation

method	bjet with 2vtx	bjet with 1+1vtx	bjet with 1vtx
Nominal Algorithm	0.009 ± 0.0004	0.005 ± 0.0005	0.011 ± 0.005
AVF&BNess	0.011 ± 0.0004	0.008 ± 0.0005	0.011 ± 0.005

TRYING DIPOLE BASED JET CLUSTERING

- jet clustering is 2→1 clustering
- But in dipole based clustering, 3→2 clustering performed
  - So, will include color dipole information
  - Especially, soft gluon emission
- This is called DICLUS
  - Construct this procedure and try jet clustering using DICLUS
  - Is there some hint for better jet clustering?
  - Distance variable: transverse momentum in rest frame of 3 jets

$$p^2_{\perp i(jk)} = \frac{(s_{ji} - (m_i + m_j)^2)(s_{ik} - (m_i + m_k)^2)}{s_{ijk}},$$

  - Choose 3 jets combination with smallest pt^2
  - And re-cluster these 3 jets in rest frame(re-cluster from track level)
  - Finally, boost back those re-clustered jets

JET DISTRIBUTION EVENT BY EVENT

DICLUS
DURHAM
TRUTH

- First trial, check jet direction event by event
- Using qqHH→qqbbbb events, 6 jet clustering
- These are good events for DURHAM clustering
- Slight difference, but not so bad
- Jet situation is very complicated, so only one method will not be better jet clustering
  - Hybrid method will be better
  - DICLUS is not good when pt^2 is large
  - Quark&gluon jet info?

- Need more study
  - jet energy resolution, etc.