Di-BJet Tagging

Jin Huang(BNL), Darren Mcglinchey(UCB), Haiwang Yu (NMSU)

sPHENIX Simulation and Software Meeting

2017-04-04

Di-BJet tagging

Generating

- Pythia8::HardQCD
  - PhaseSpace:pTHatMin = 10.0
- PHPy8JetTrigger (Event Level)
  - pT > 20GeV, |eta| < 0.6, JetR = 0.4
- Jin's HFJetTruthTrigger: (Flavor tagger)
  - pT > 10GeV, |eta| < 1

Analysis

- Jet:
  - pT > 20 GeV (leading) 10GeV (subleading)
  - |eta| < 0.6
- Track:
  - Quality < 5.0
  - pT > 1 GeV
  - DCA < 1000 micron

Status

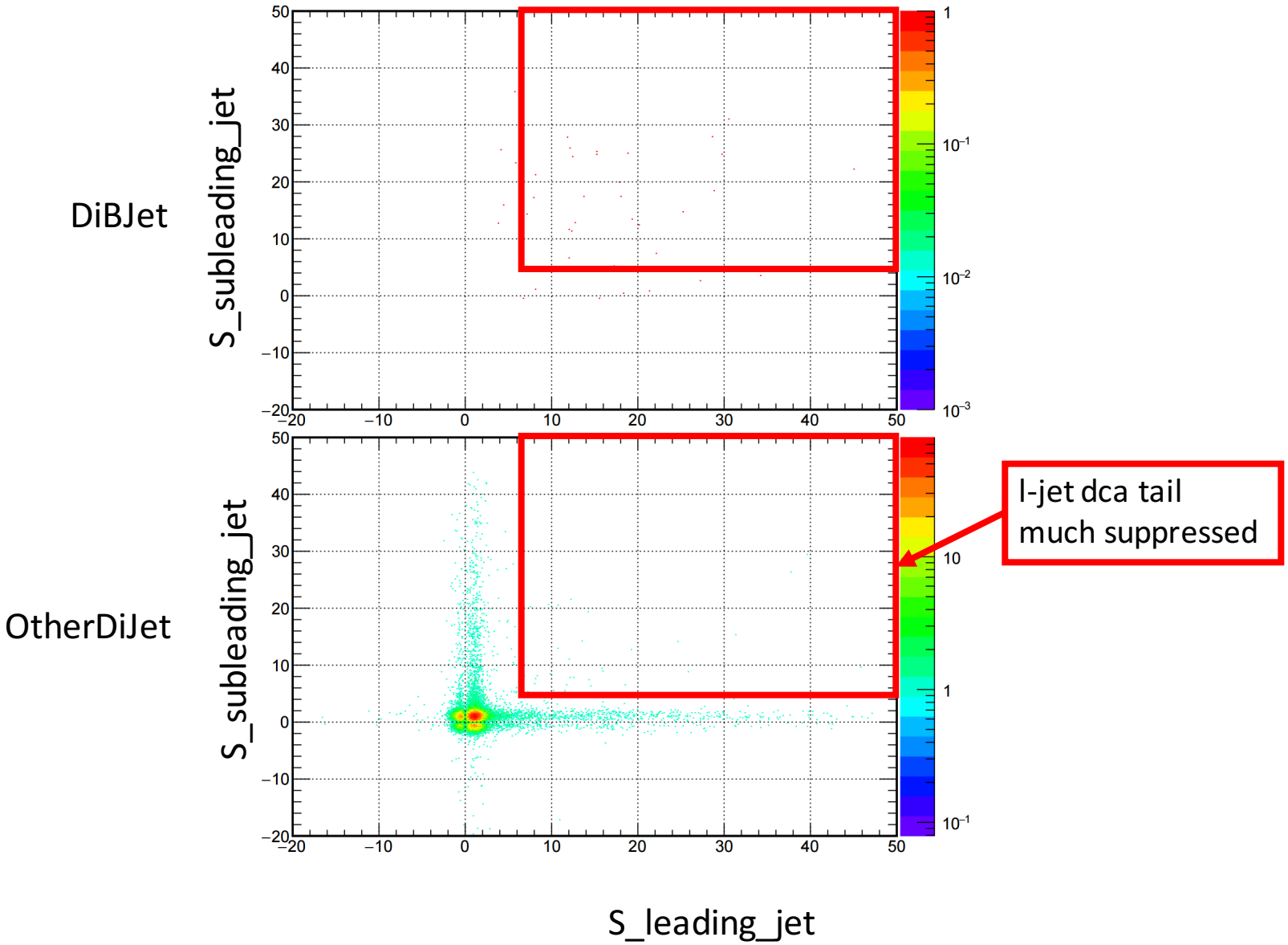
- finished 100k pp without embedding

Di-BJet Efficiency and Purity Definitions:

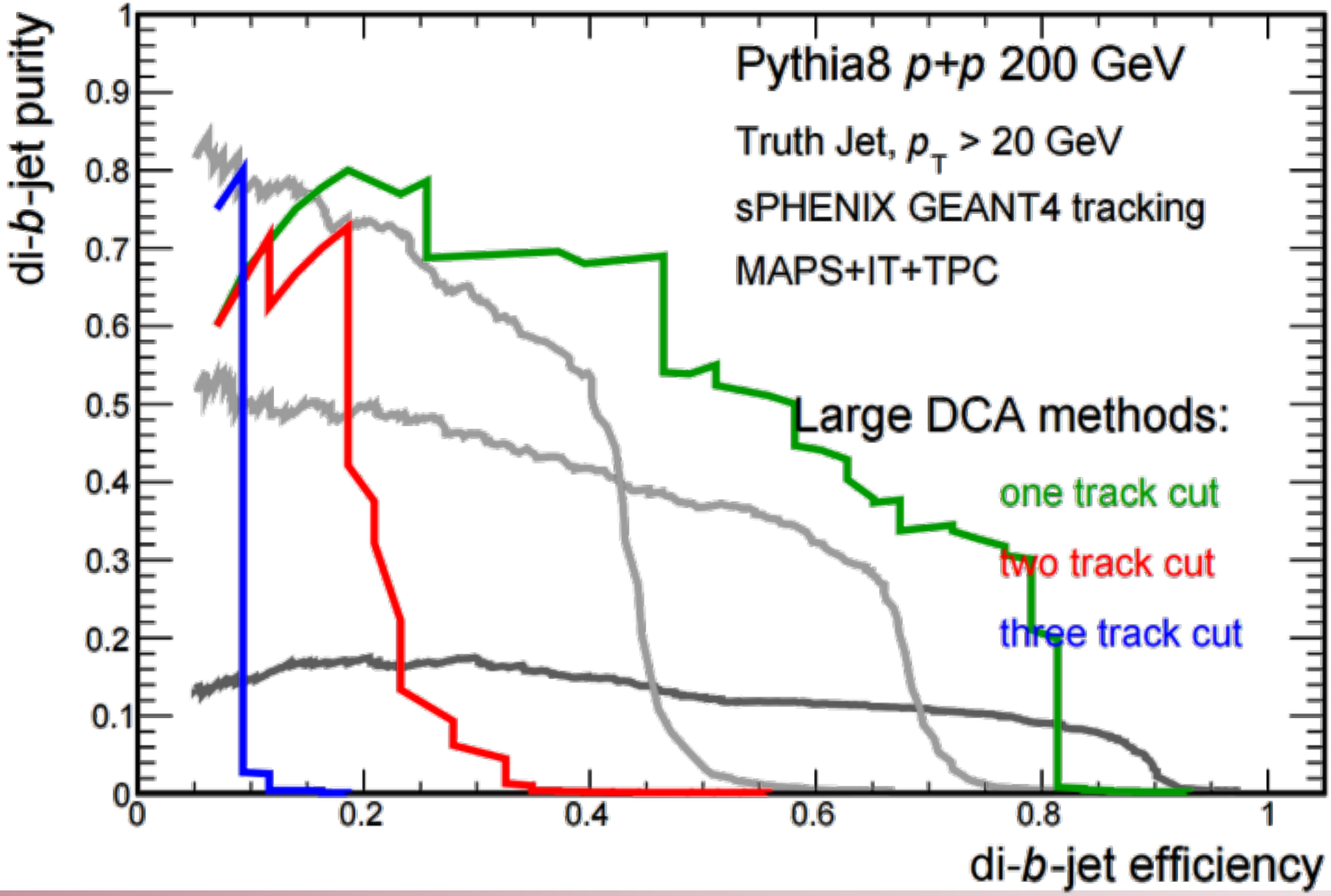
$$E_{DiBJet} := \frac{N^{Tagged}_{DiBJet}}{N^{All}_{DiBJet}}$$

$$P_{DiBJet} := \frac{N^{Tagged}_{DiBJet}}{N^{Tagged}_{DiBJet} + N^{Tagged}_{OtherDiJet}}$$

sigmalized 3d DCA distribution



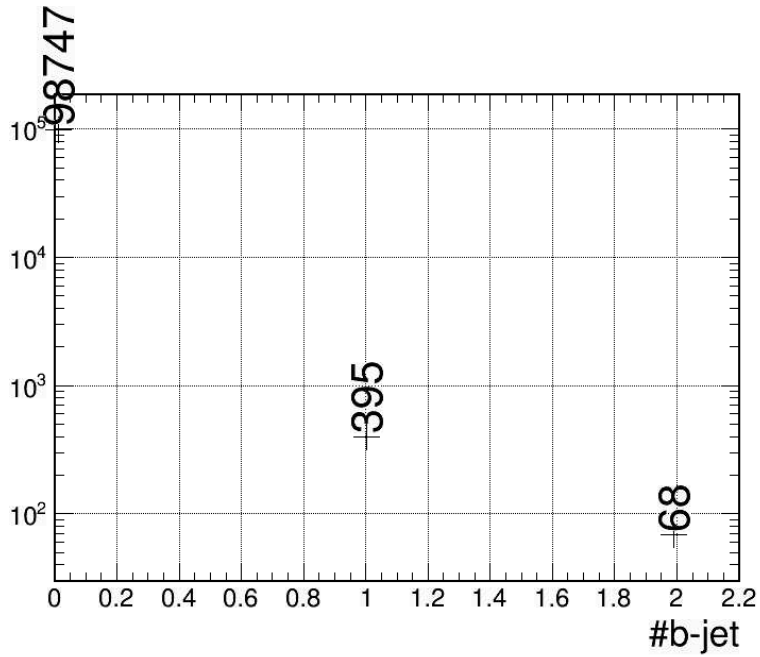
Results compared with single b-jet (grey) tagging:



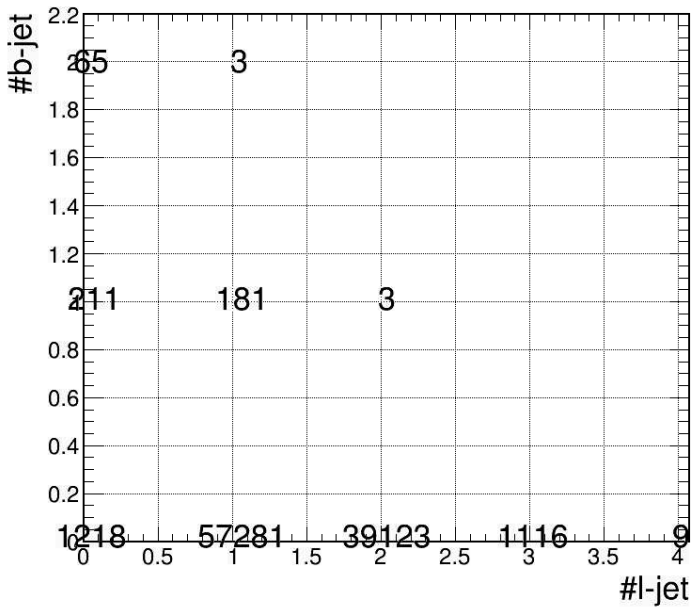
Truth Flavor Tagging

Jet pT > 10 GeV
|Jet eta| < 0.6

Number of b-jets



Number of b-jets vs. number of l-jets



To-do

- More statistics for pp
  - study c-jet effect
- Re-run flavor tagger for Hijing embedding?
- Eff. * Purity vs. Eff. for both single and di- b-jet tagging

Backups

Truth Flavor Tagging: b-jet + l-jet

Row	Instance	flavor	pt	eta	phi
40	0	-5	19.562398	0.4740352	2.9966392
40	1	0	38.832851	0.0380932	-0.344172
119	0	-5	10.599534	-0.392733	-0.122920
119	1	0	25.178281	0.347709	-2.658196
195	0	0	13.876345	-0.492992	-1.221393
195	1	5	21.652751	0.1157484	2.0719602
798	0	5	13.542386	0.0893574	2.4630336
798	1	0	23.775817	-0.478155	-1.193758
919	0	0	18.543314	0.5300093	-2.838419
919	1	5	22.692144	-0.055454	0.3886929
1107	0	5	15.369135	-0.311462	0.7359435
1107	1	0	23.595781	0.1217126	-2.769374
1758	0	5	21.56357	-0.332725	1.0664643
1758	1	0	23.678159	-0.382698	-2.222616
2342	0	-5	15.720429	-0.505502	-0.071149
2342	1	0	20.540275	-0.405575	-3.130977
4600	0	-5	17.449518	-0.262232	0.0897381
4600	1	0	30.111951	0.1180970	2.8893647
5756	0	5	18.806097	-0.375326	1.3508650
5756	1	0	20.003015	-0.586501	-1.908140
5786	0	5	13.016783	0.1269792	-3.034177
5786	1	0	22.797775	-0.084952	0.1897134
6085	0	0	13.263346	0.2031070	-0.689893
6085	1	5	22.175851	-0.188905	2.6264820
6443	0	5	16.132692	-0.070205	1.6150488

Truth Flavor Tagging: di-b-jet

Row	Instance	flavor	pt	eta	phi
2990	0	5	11.183524	0.4395548	0.3419730
2990	1	-5	20.729045	0.1965397	-3.099176
3504	0	0	10.522263	0.1839923	-1.984435
3504	1	5	17.185548	0.4098176	2.5348682
3504	2	-5	20.724170	0.1650245	-0.101600
7261	0	5	11.734899	-0.584177	1.8929885
7261	1	0	11.442518	0.8804393	2.5487637
7261	2	-5	31.266264	0.3225381	-0.657991
8951	0	5	14.124184	0.3092545	1.8591550
8951	1	-5	20.438245	0.4620236	-1.342044
14253	0	-5	18.204515	-0.189432	2.3342051
14253	1	5	26.303751	-0.294856	-0.908356
23209	0	5	17.878290	0.1480468	-1.832768
23209	1	-5	21.590608	0.0130403	1.3336279
23359	0	5	11.357789	-0.076554	2.1671676
23359	1	-5	20.441793	0.3570499	-1.148833
24189	0	5	18.743482	0.2273622	-0.277373
24189	1	-5	25.391769	-0.162054	2.7531955
25227	0	-5	20.979005	-0.310798	1.4028488
25227	1	5	28.630706	0.5660024	-1.685799
25867	0	-5	22.458990	-0.208190	2.3614456
25867	1	5	22.053384	-0.446211	-1.089613
26139	0	5	24.111206	0.0472498	-0.755246
26139	1	-5	27.640377	0.5528326	2.3112919
27133	0	5	13.178979	0.0721070	-2.438454