Semi-Visible Jets

David Lai

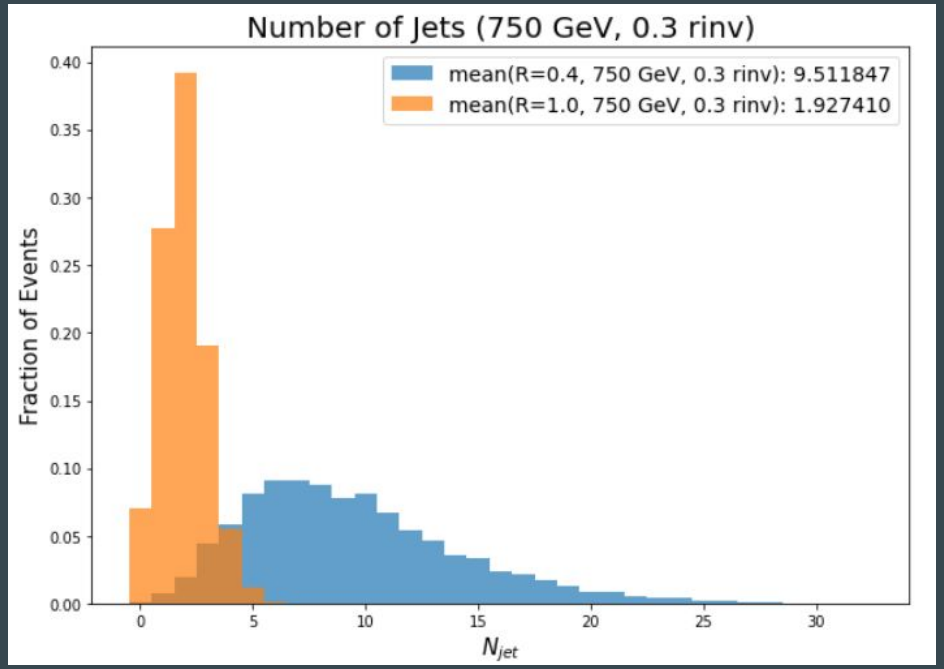
Progress

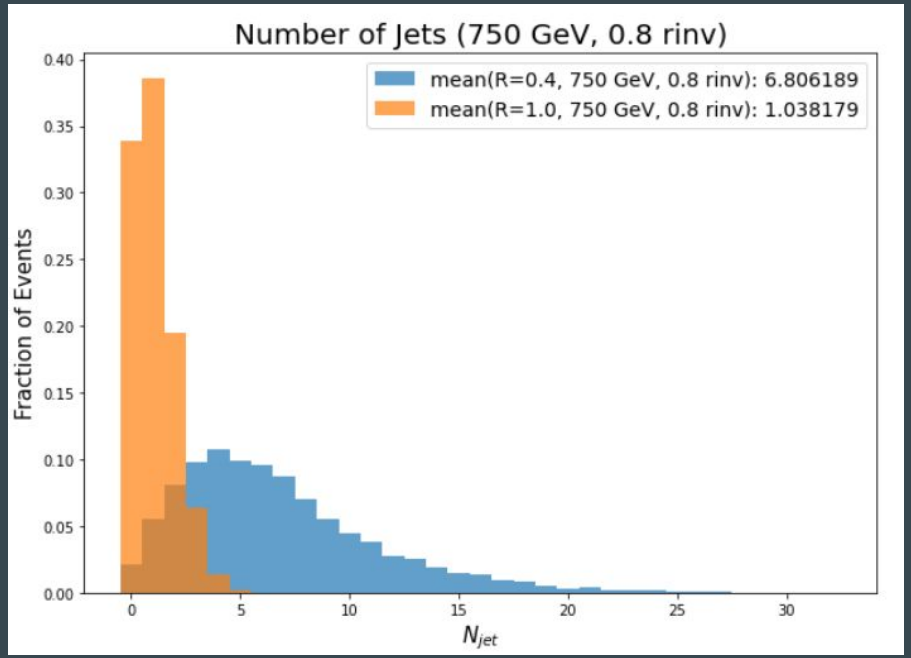
- Download/rucio get DAOD files from Joe's Dataset (successful)
- Converting DAOD to nTuple files (successful)
    - 750 GeV & 0.3 rinv, 750 GeV & 0.8 rinv, 1500 GeV & 0.3 rinv, 1500 GeV & 0.8 rinv.
- Make Selection Cuts (complete)
- Plot Kinematic Plots (complete)

Cut Flow Table

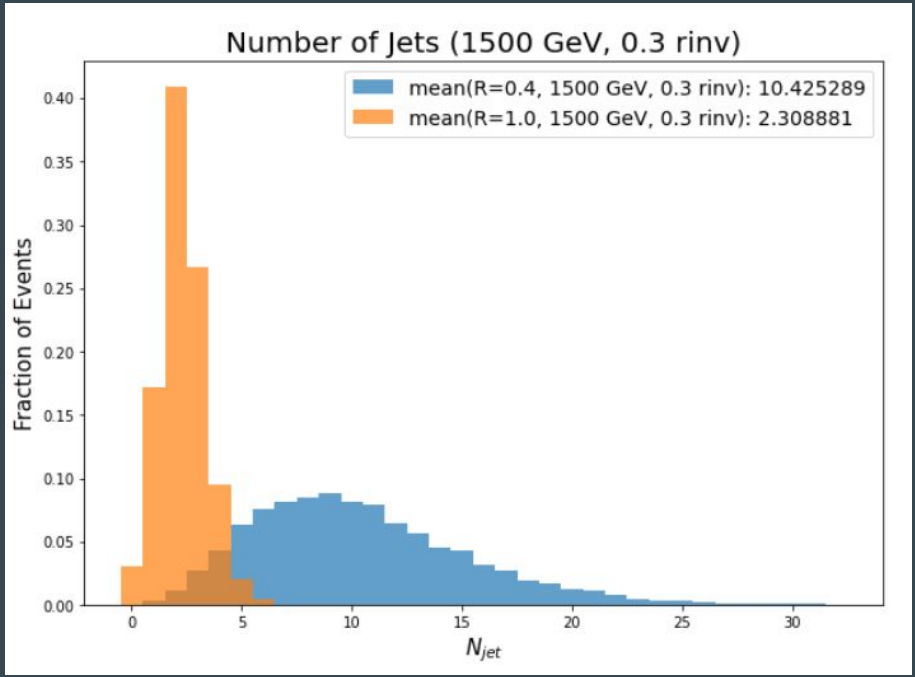
	Selection Cut (750 GeV, 0.3 rinv)	R=0.4 (750 GeV, 0.3 rinv)	R=1.0 (750 GeV, 0.3 rinv)	Selection Cut (750 GeV, 0.8 rinv)	R=0.4 (750 GeV, 0.8 rinv)	R=1.0 (750 GeV, 0.8 rinv)	Selection Cut (1500 GeV, 0.3 rinv)	R=0.4 (1500 GeV, 0.3 rinv)	R=1.0 (1500 GeV, 0.3 rinv)	Selection Cut (1500 GeV, 0.8 rinv)	R=0.4 (1500 GeV, 0.8 rinv)	R=1.0 (1500 GeV, 0.8 rinv)
0	Input Event Size	9960	9960	Input Event Size	9953	9953	Input Event Size	9965	9965	Input Event Size	9960	9960
1	Number of Jet >= 2	9865	6494	Number of Jet >= 2	9187	2743	Number of Jet >= 2	9921	7946	Number of Jet >= 2	9422	4024
2	Jet PT > 25 GeV	70	6483	Jet PT > 25 GeV	108	2735	Jet PT > 25 GeV	72	7935	Jet PT > 25 GeV	120	4015
3	|eta| < 2.5	47	4970	|eta| < 2.5	84	2016	|eta| < 2.5	60	6463	|eta| < 2.5	89	3081

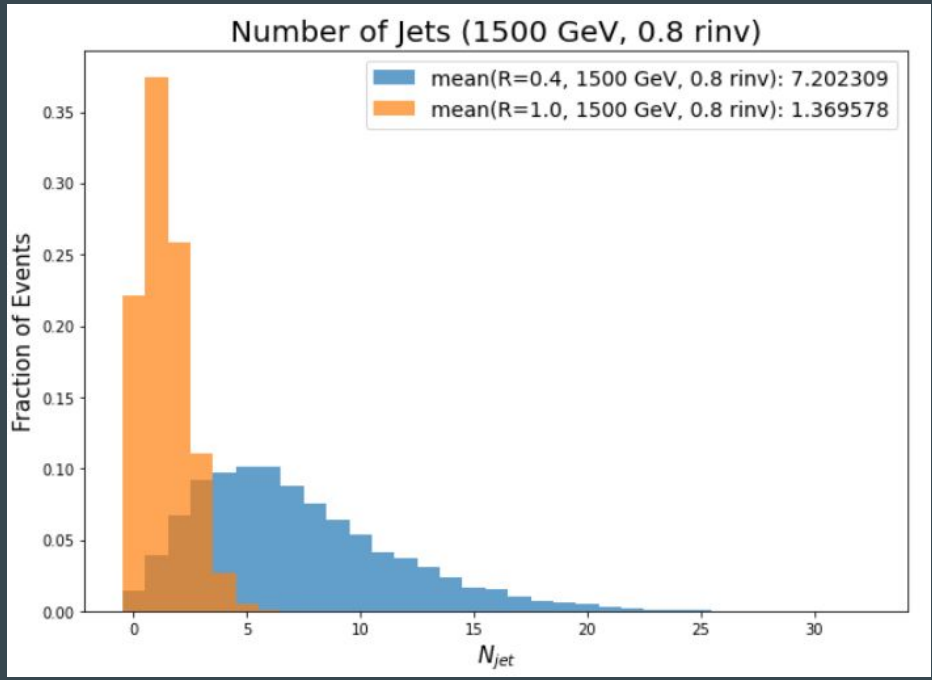
Number of Jets



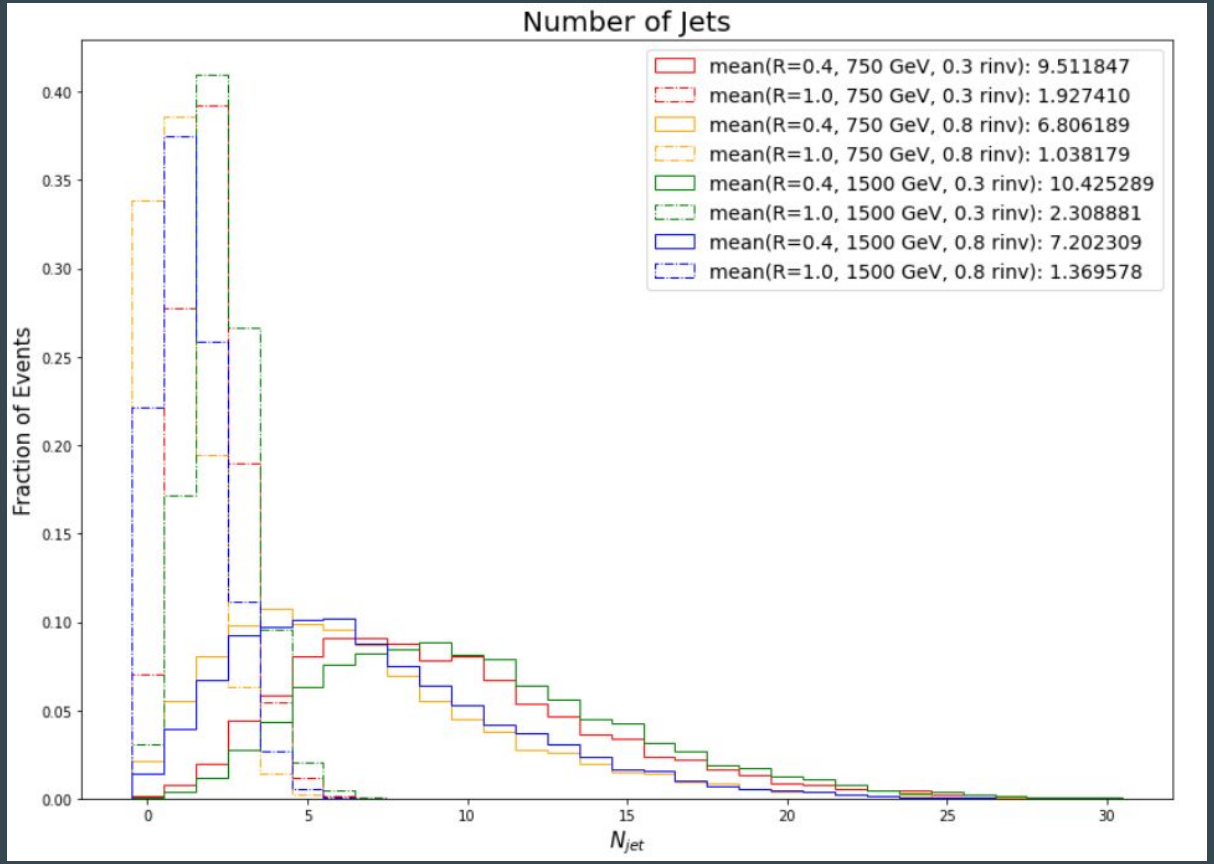


Number of Jets

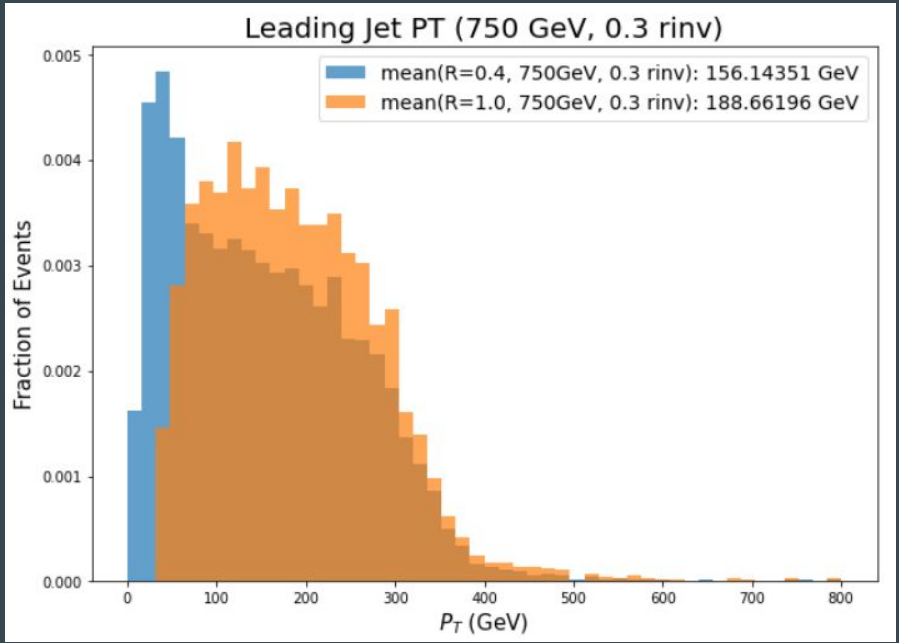


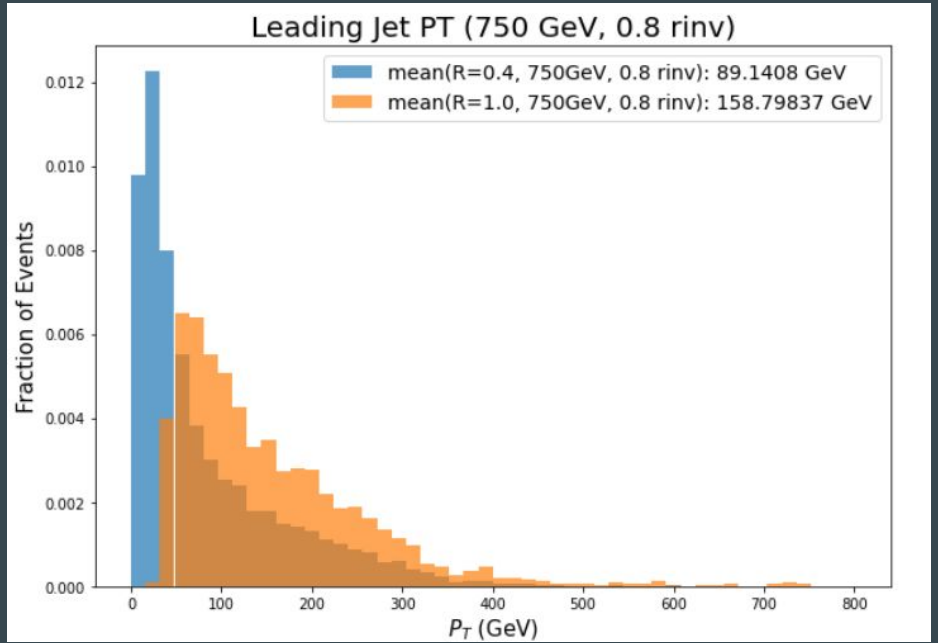


Number of Jets

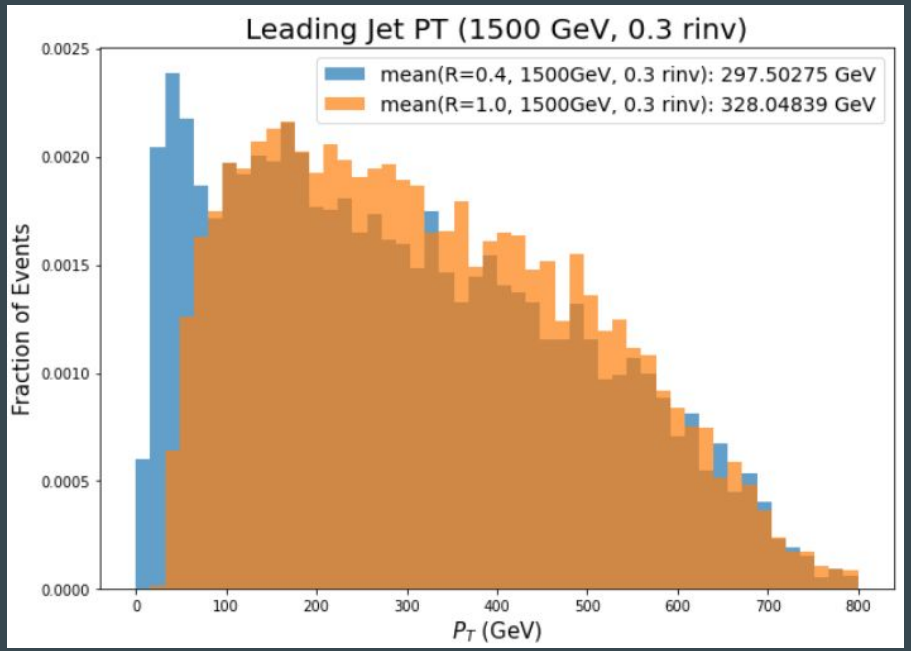


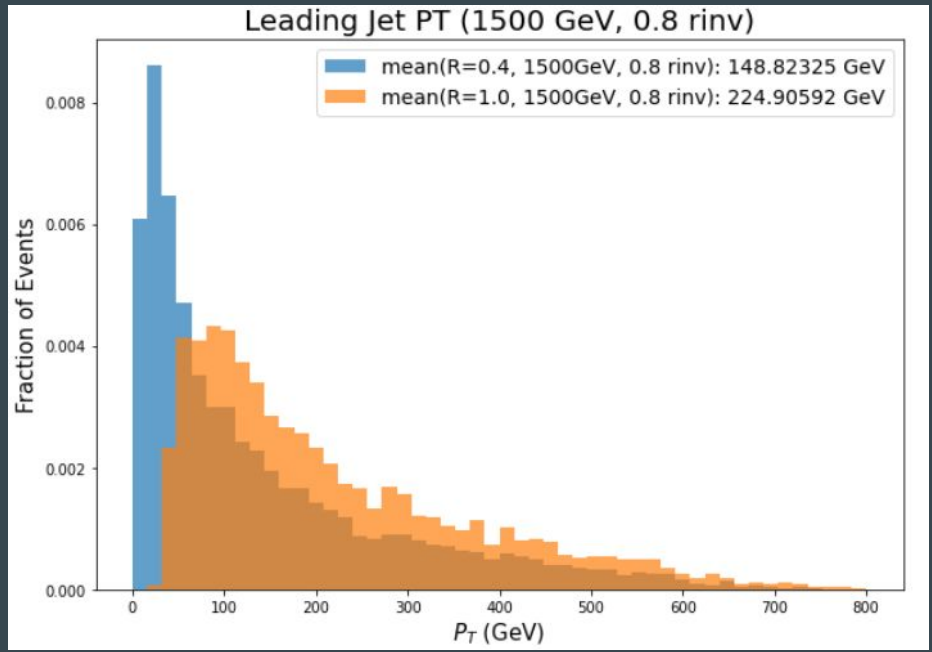
Leading Jet PT





Leading Jet PT





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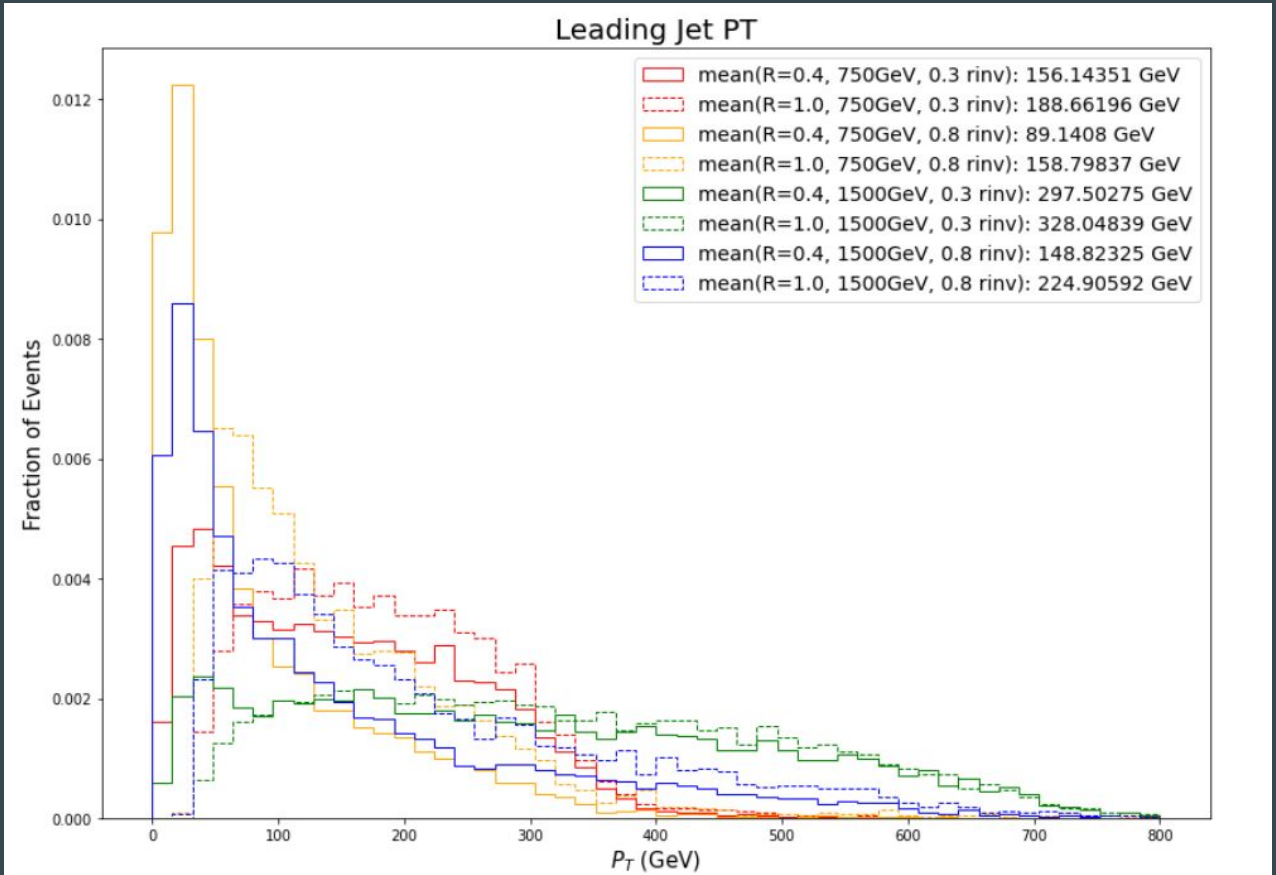
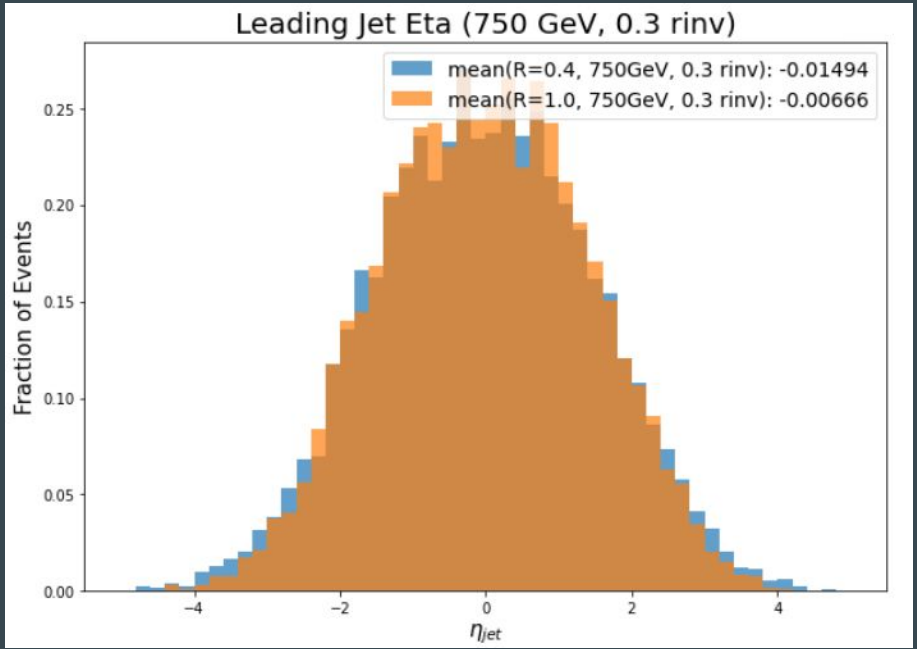
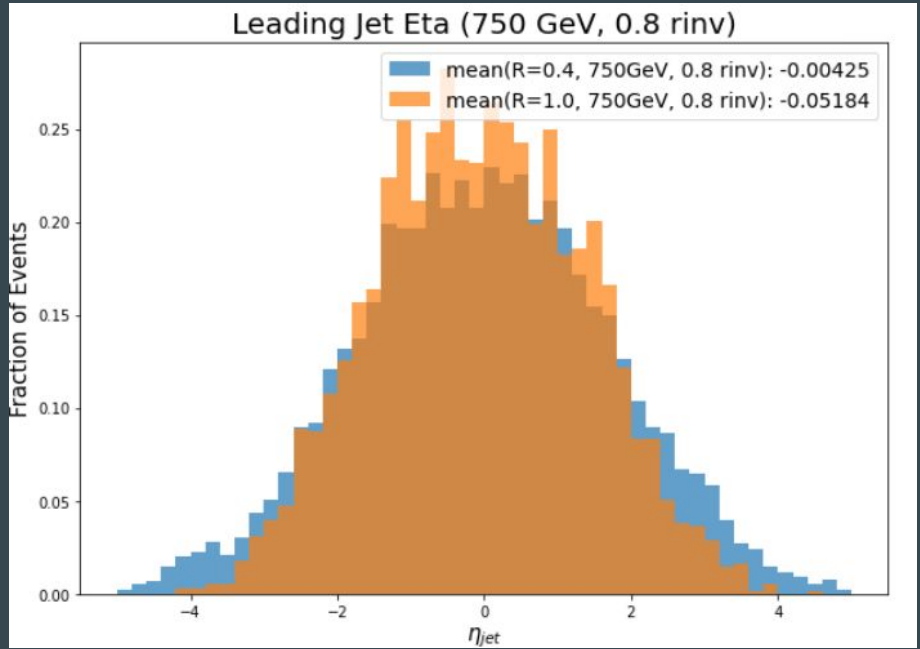


Leading Jet Eta





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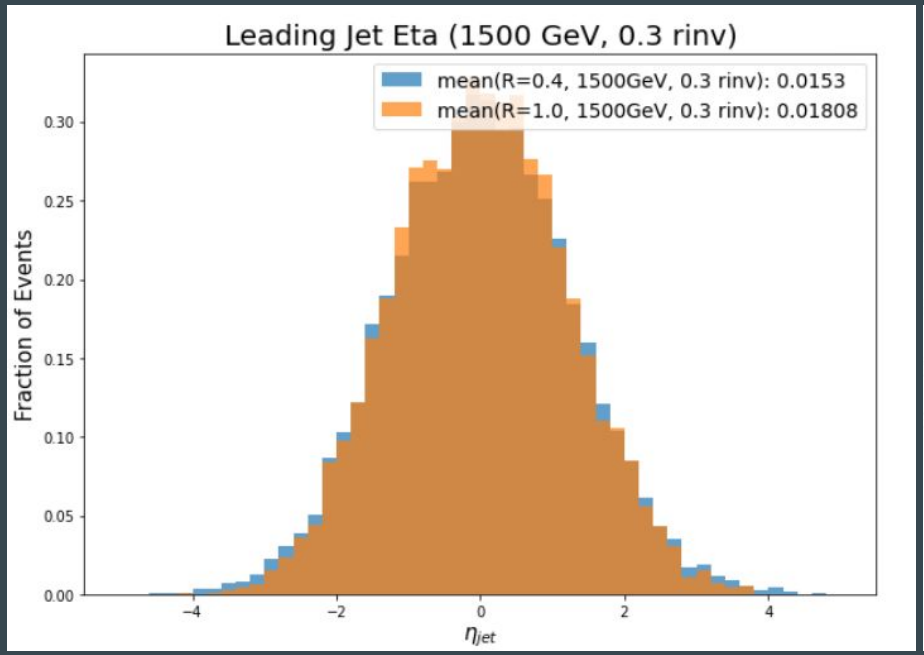
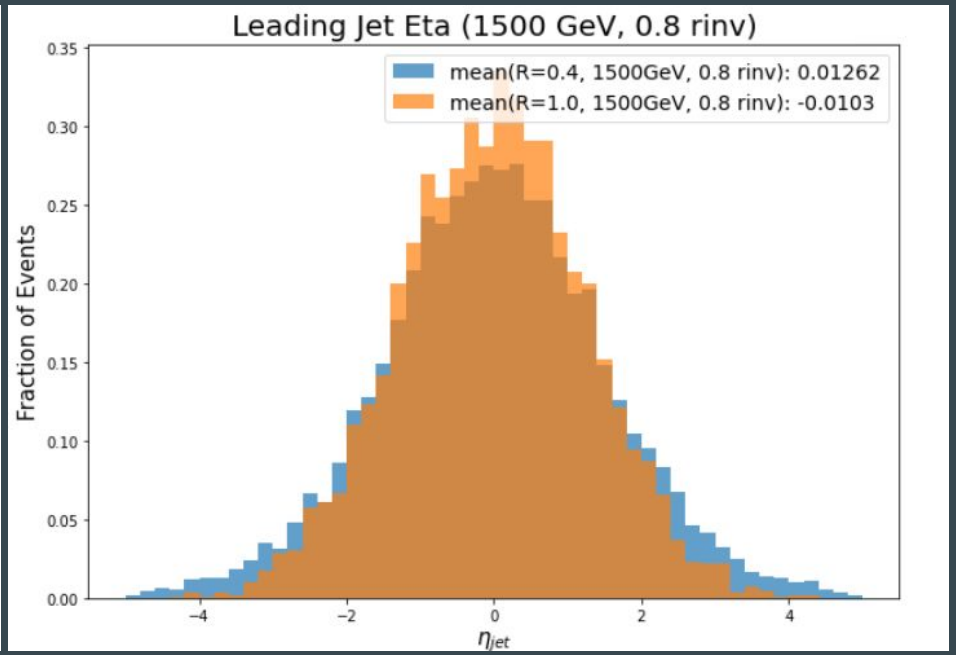
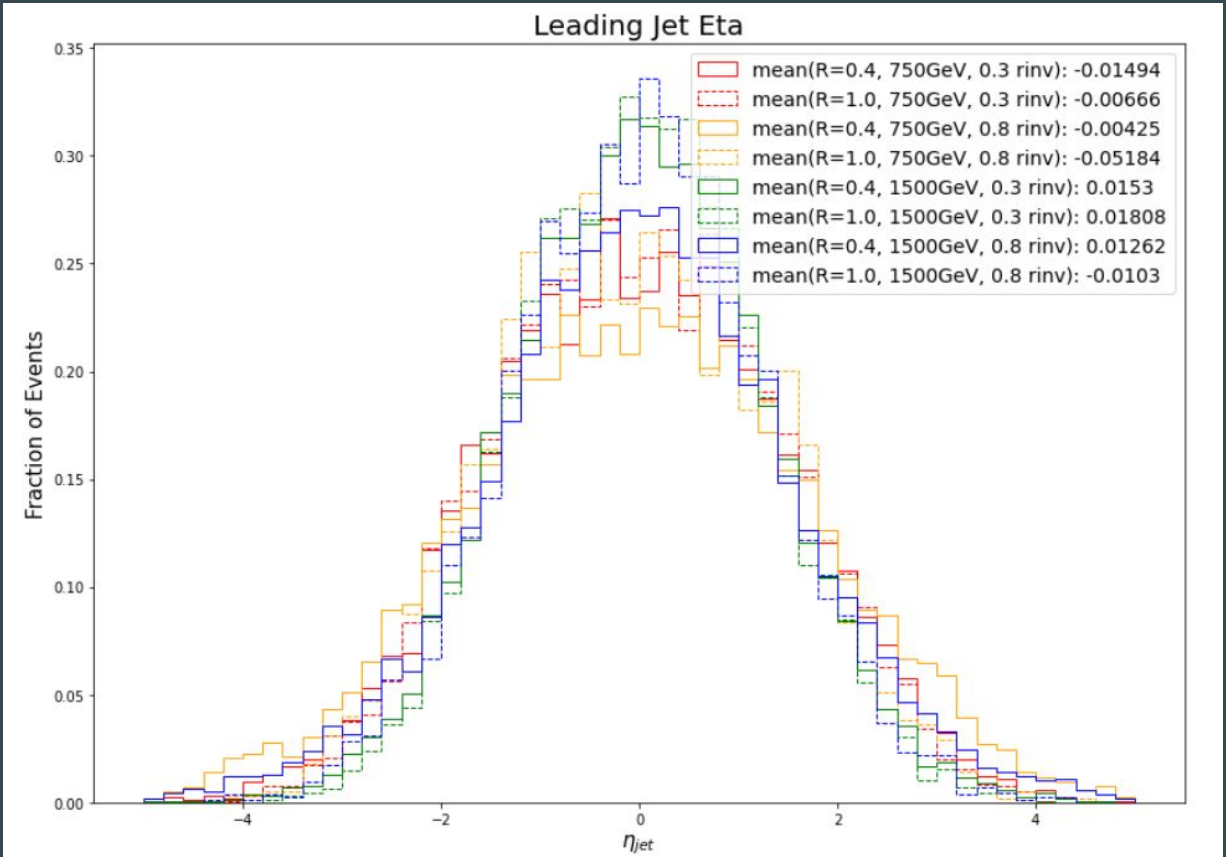
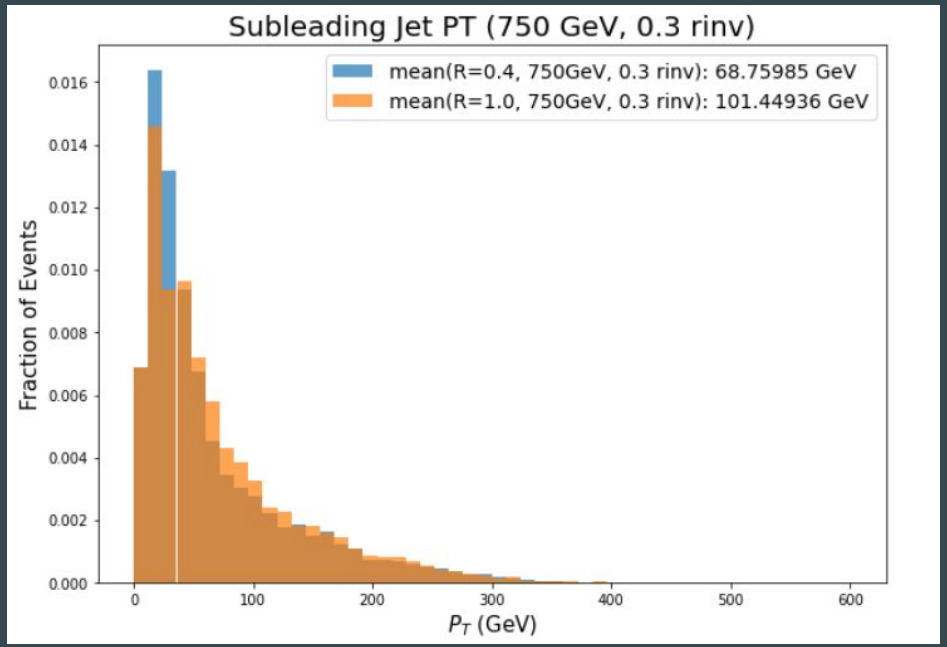


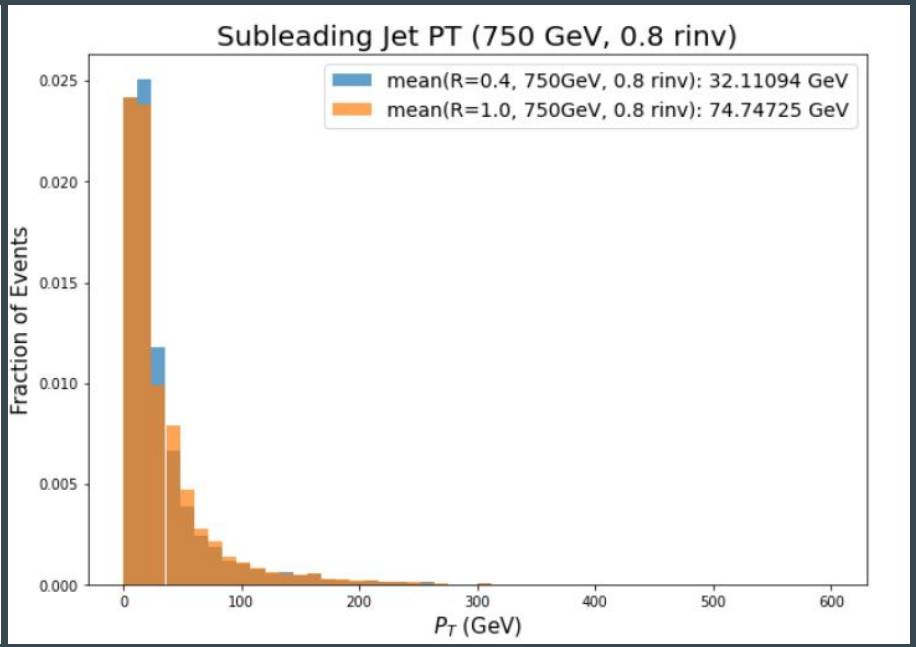


Leading Jet Eta

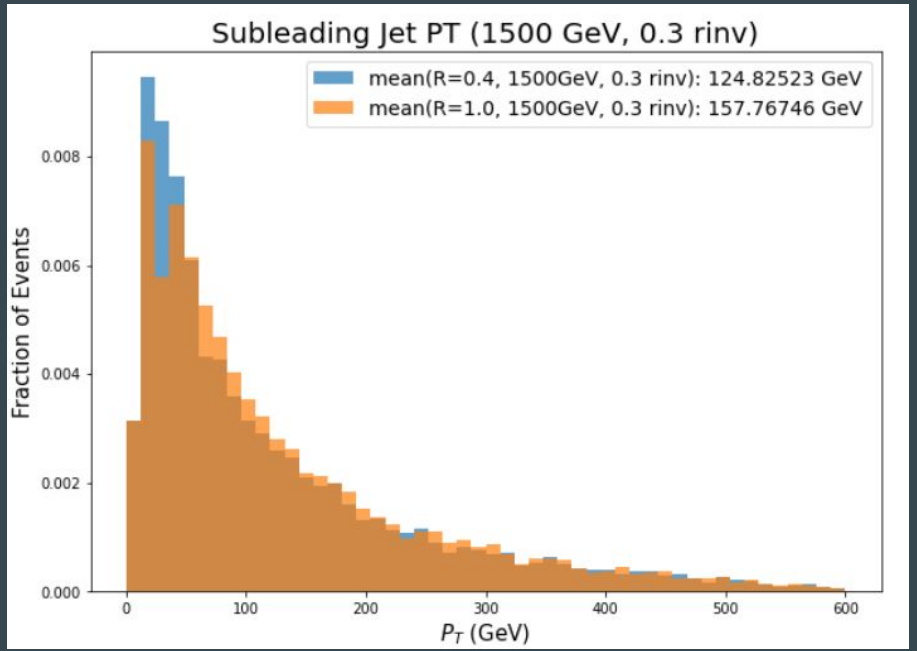


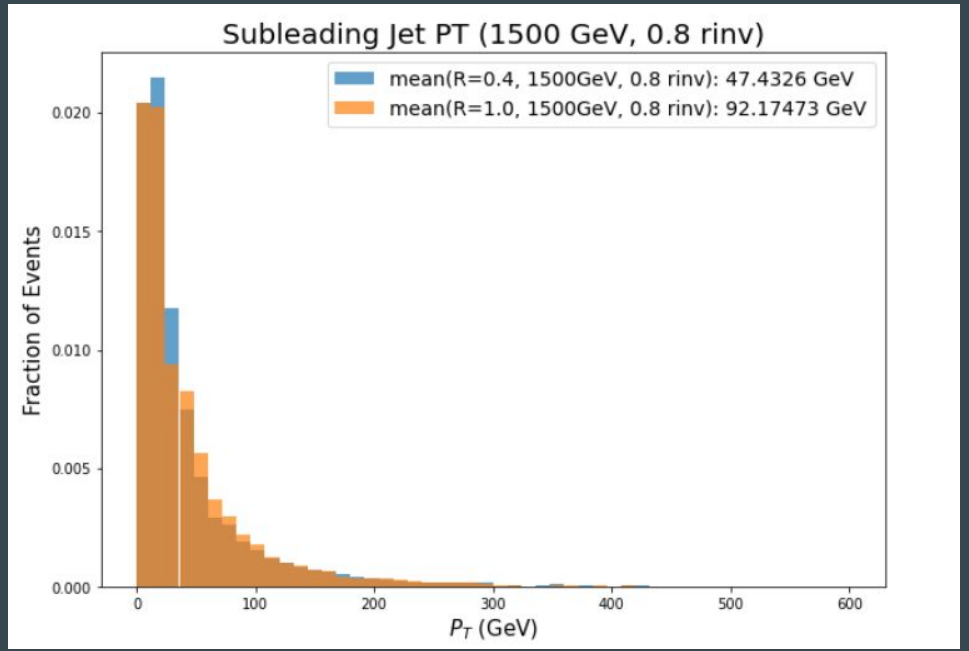
Subleading Jet PT





Subleading Jet PT





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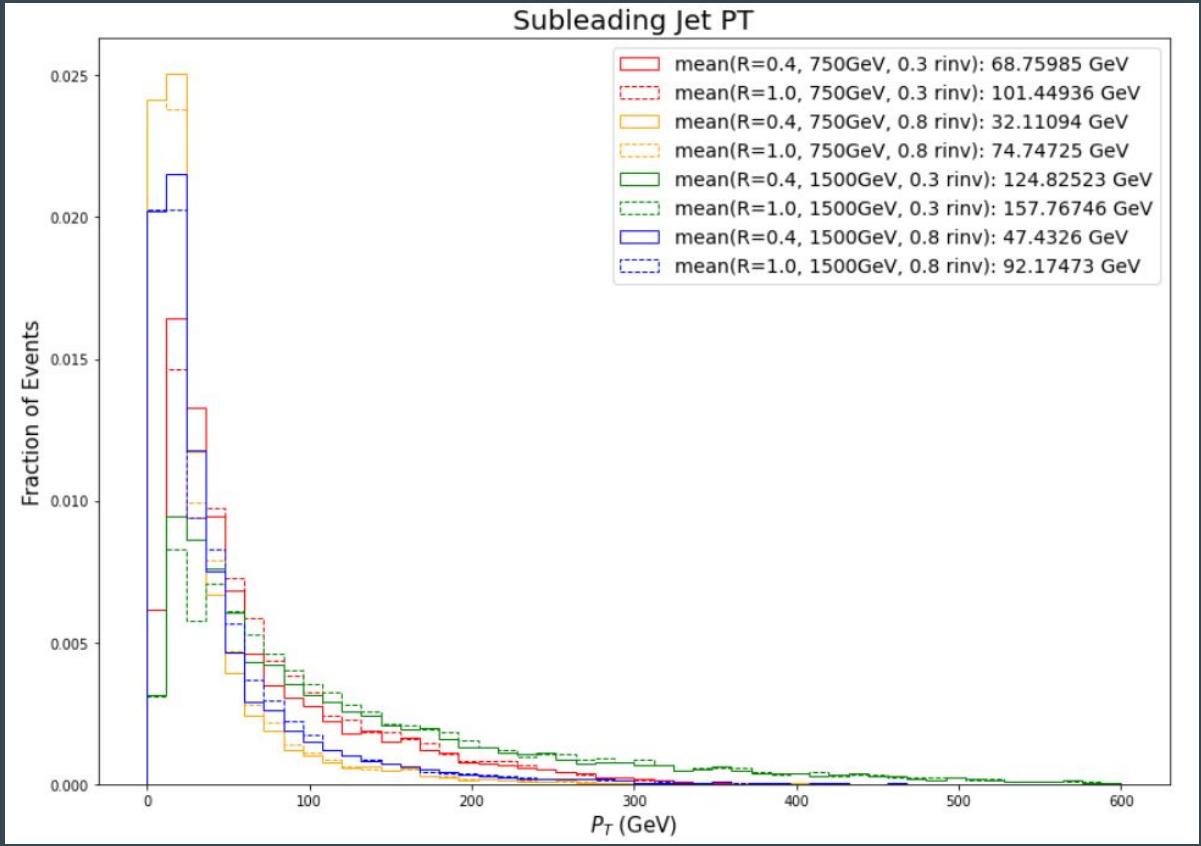

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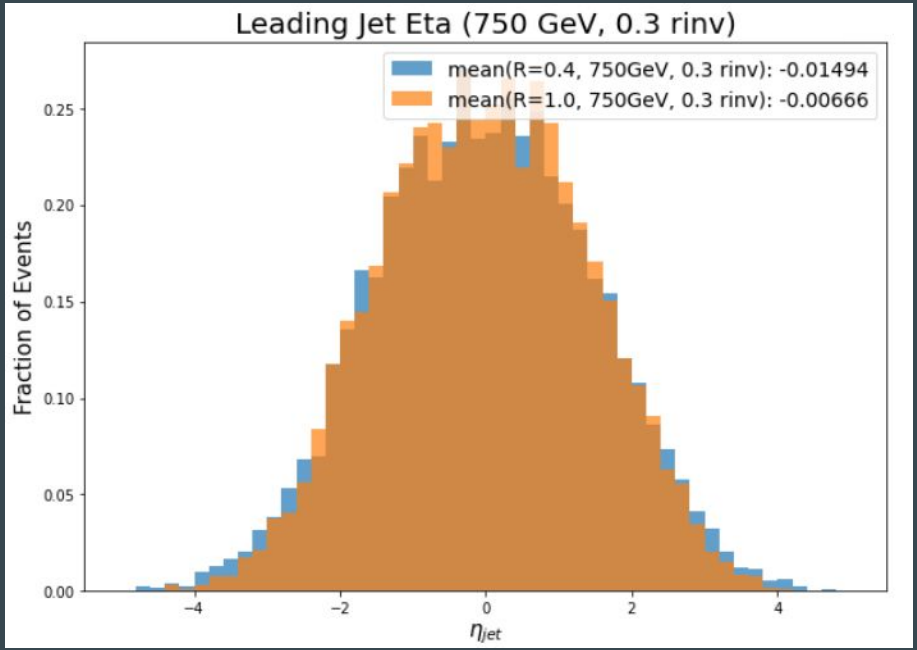

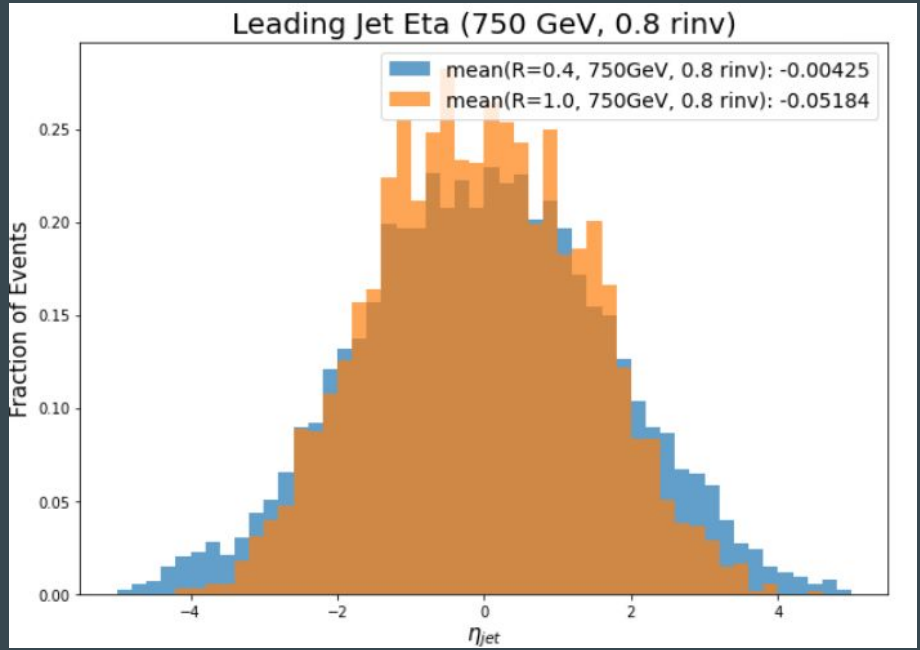

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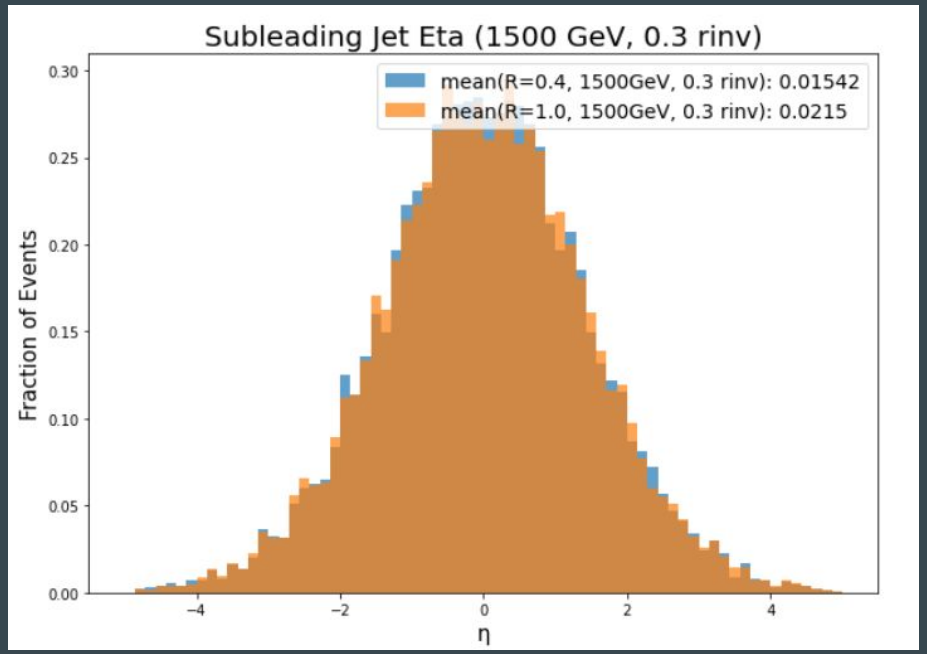
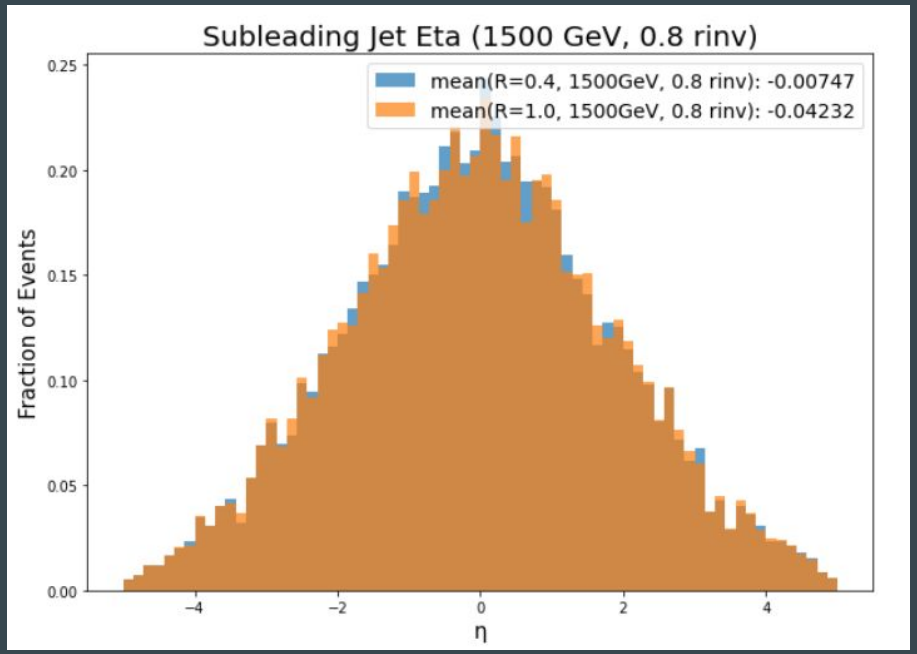
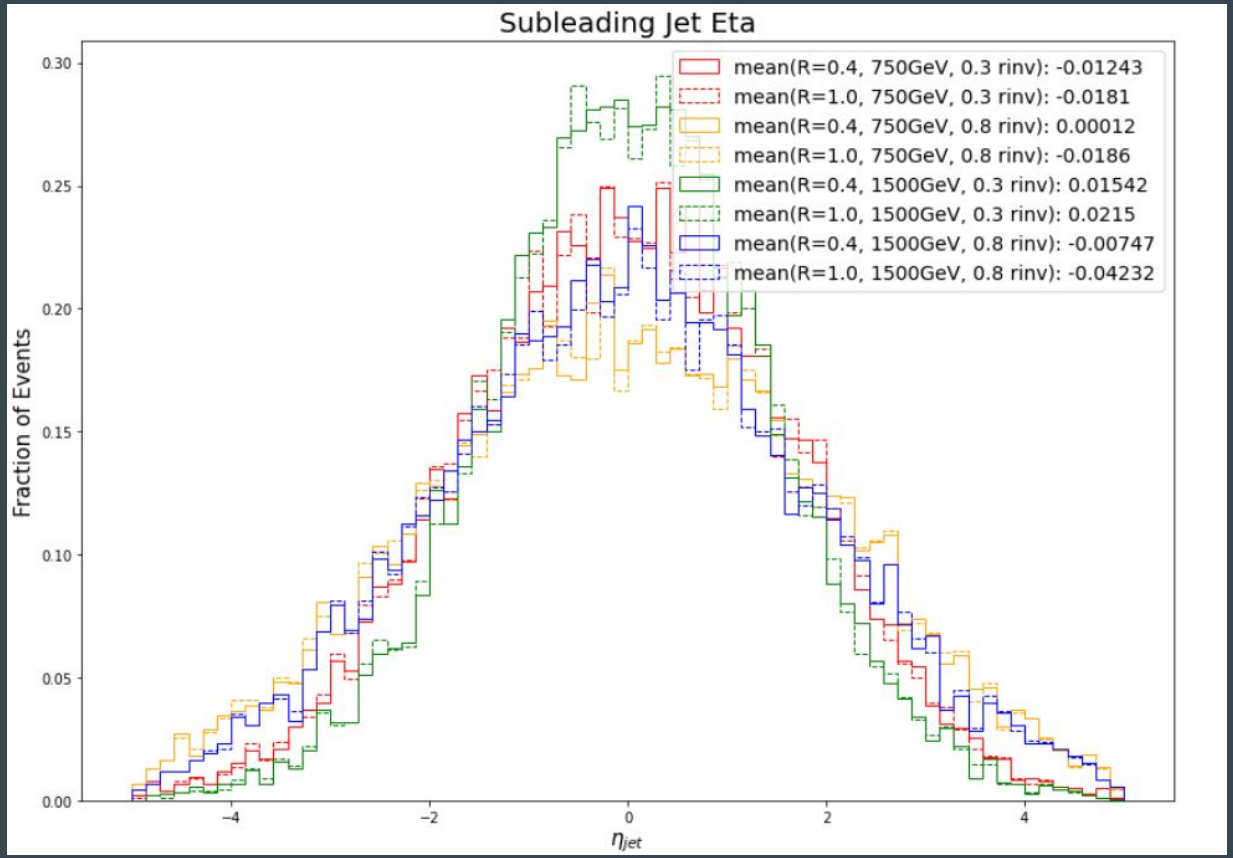
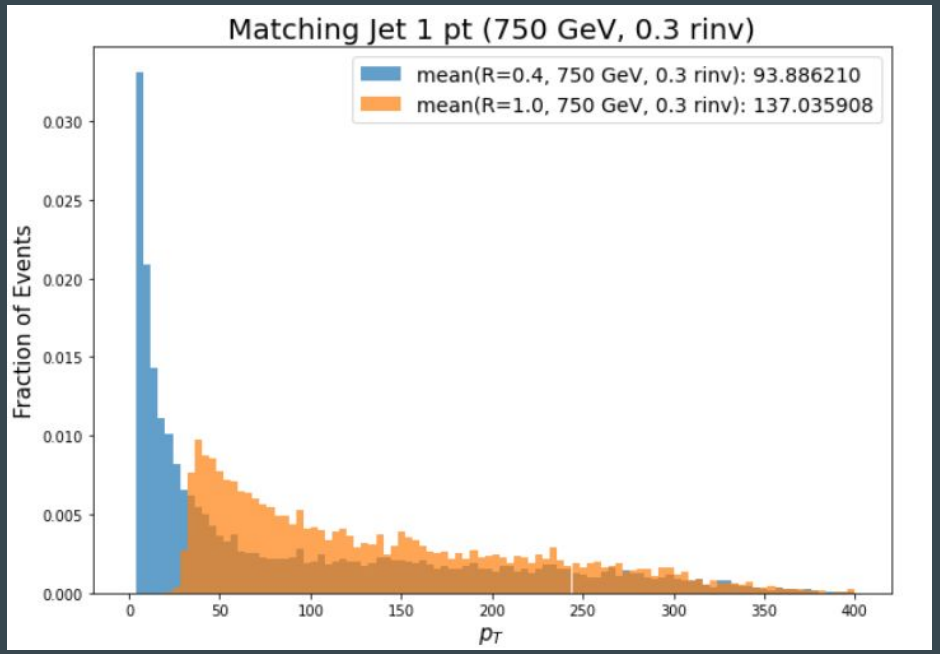


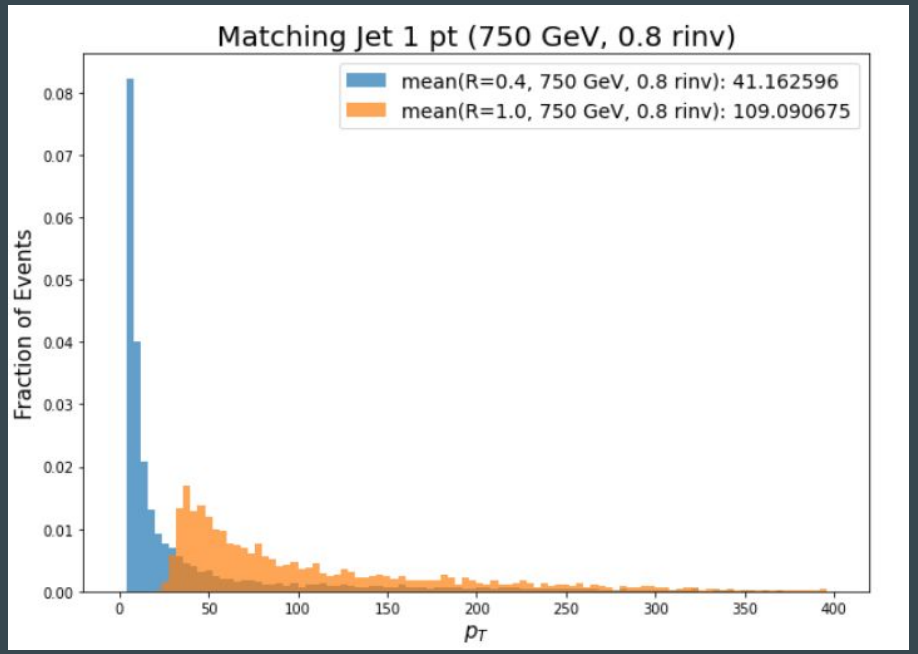


Subleading Jet Eta

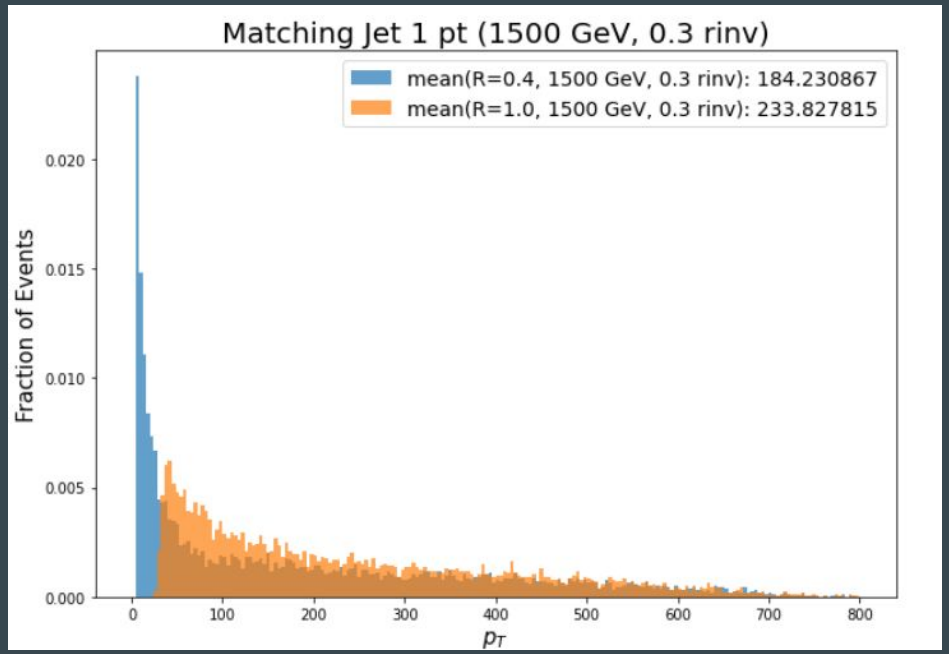


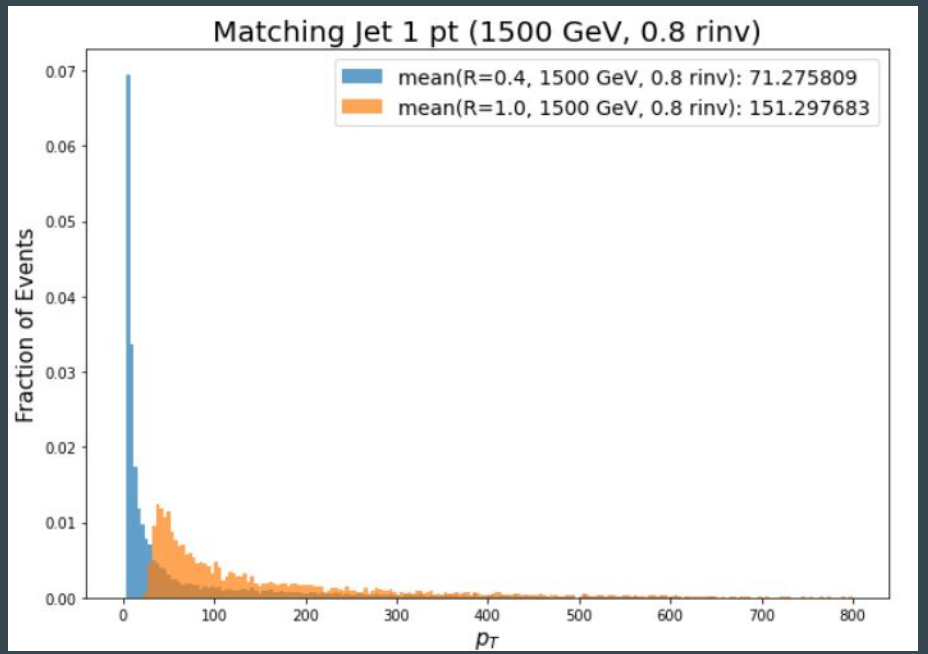
Matching Jet 1 pt



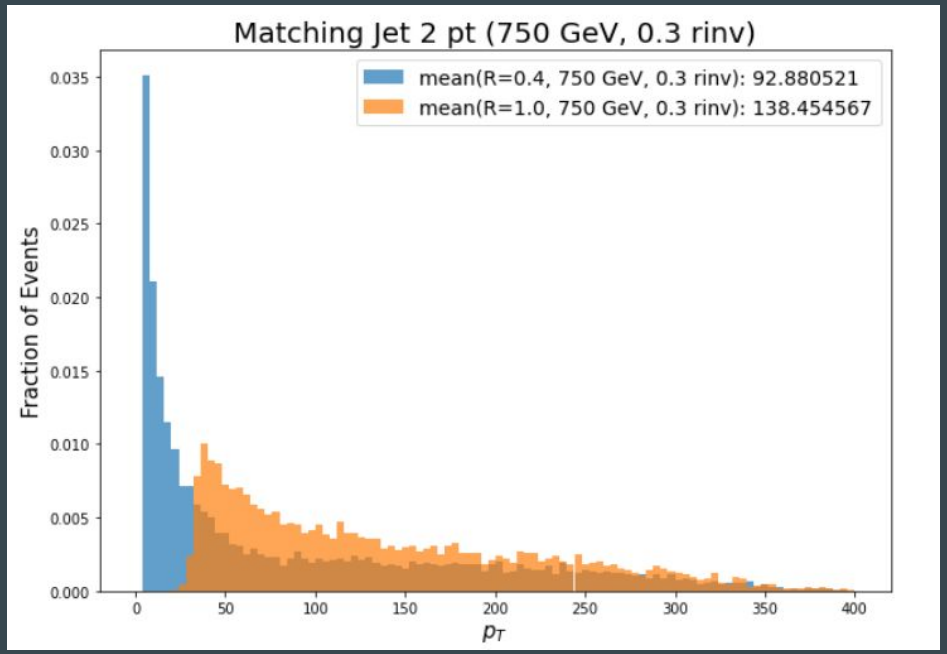


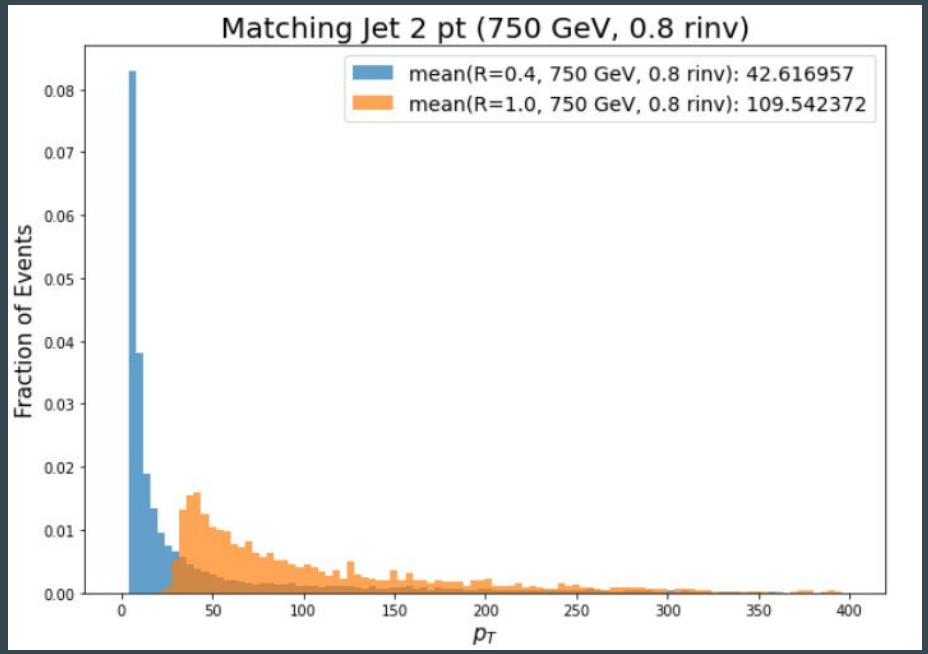
Matching Jet 1 pt



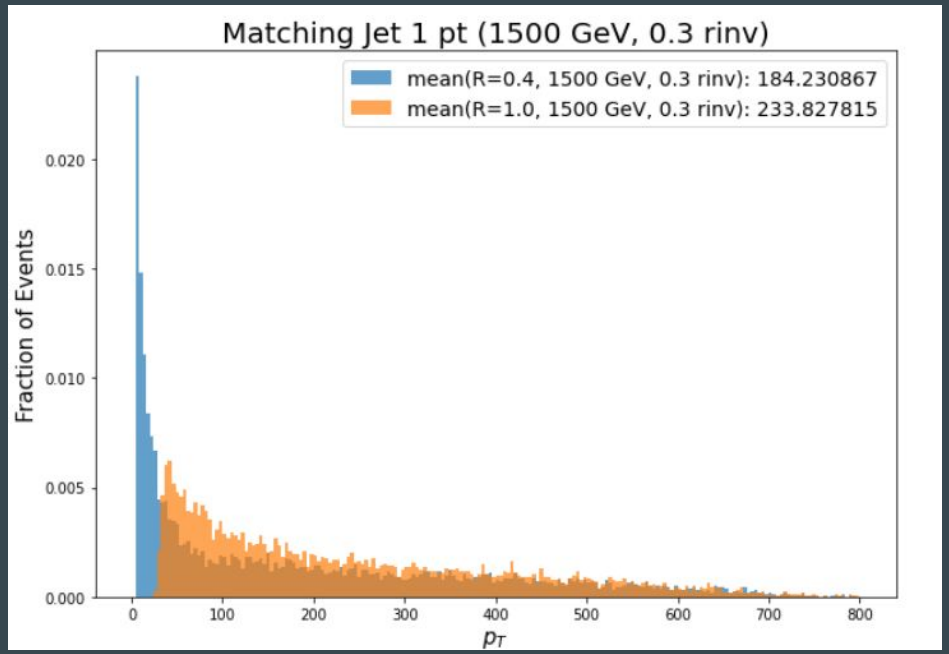


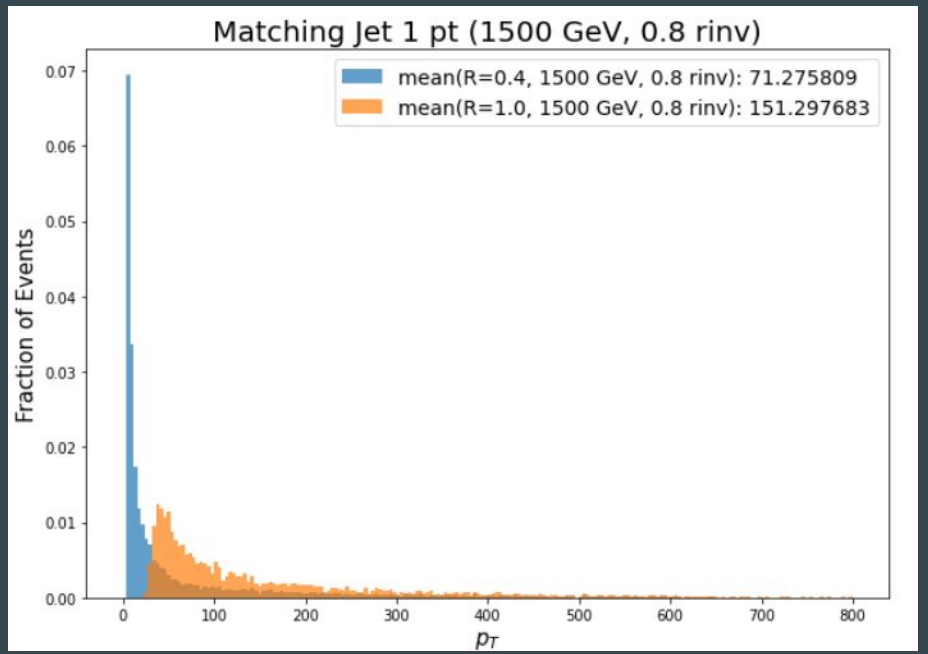
Matching Jet 2 pt



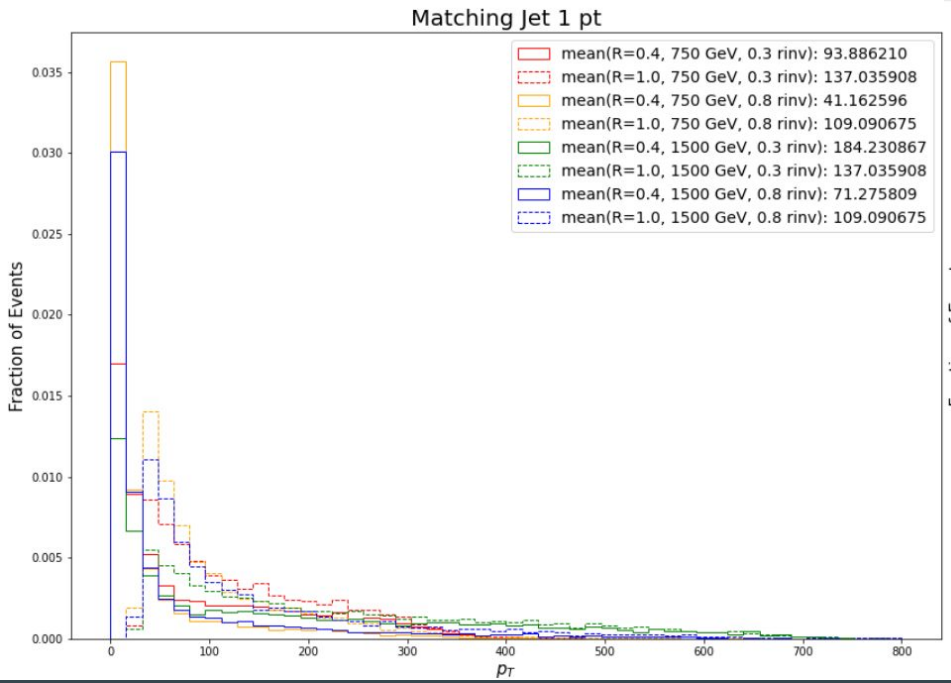


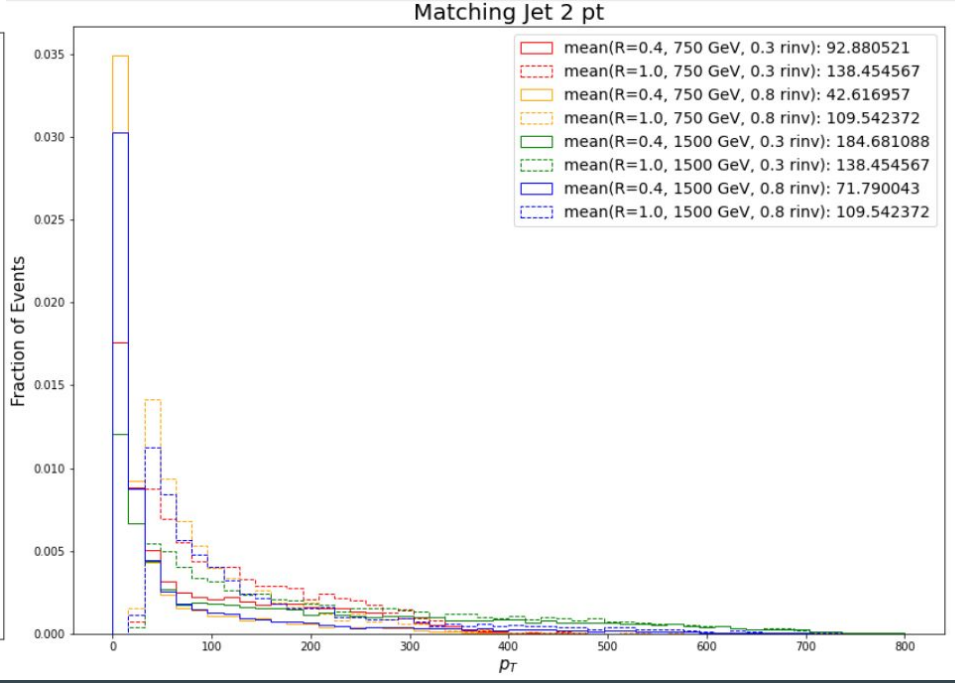
Matching Jet 2 pt



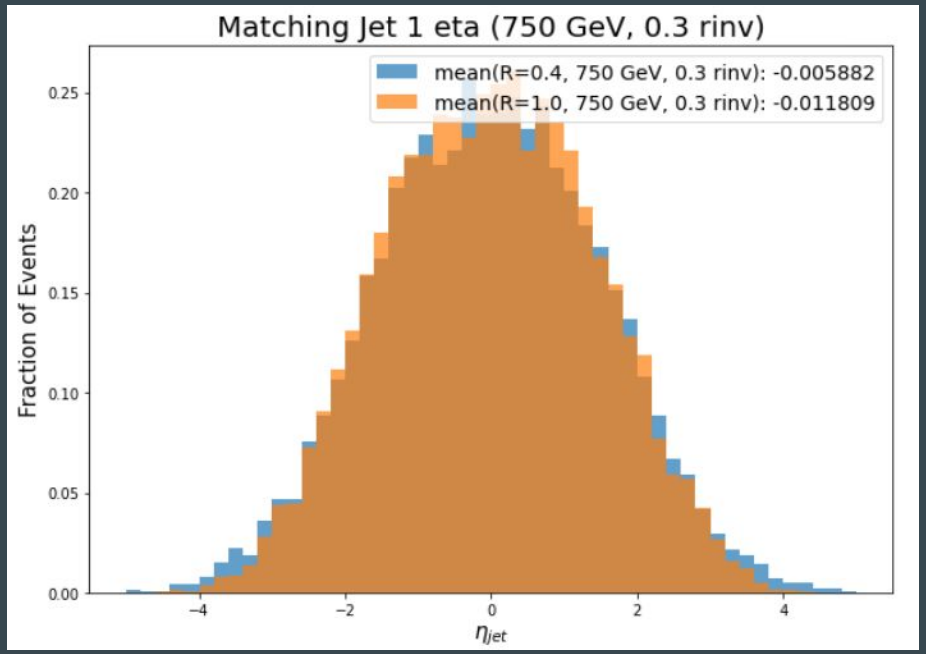


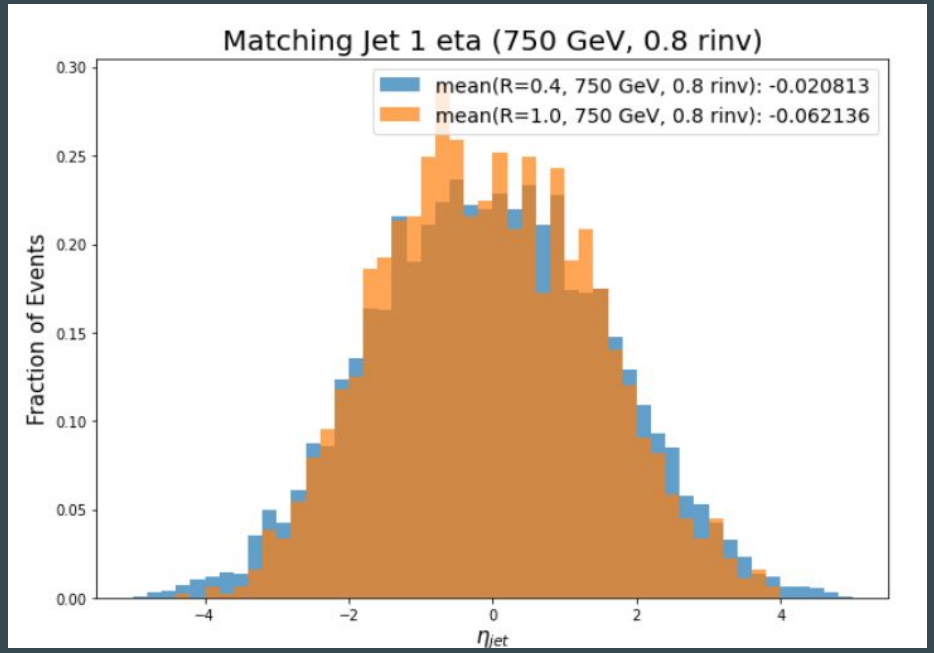
Matching Jet 1 pt & Matching Jet 2 pt



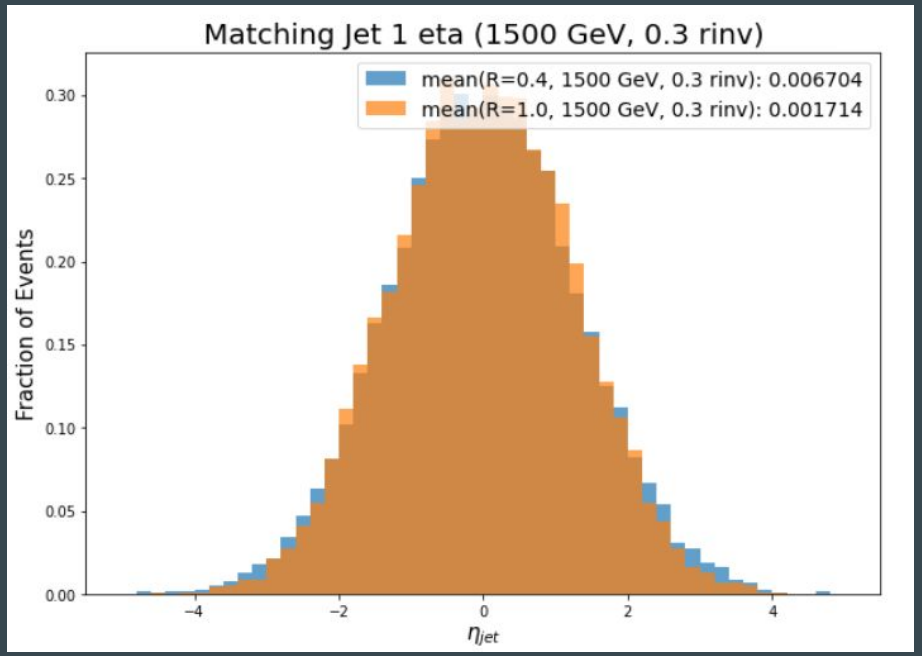


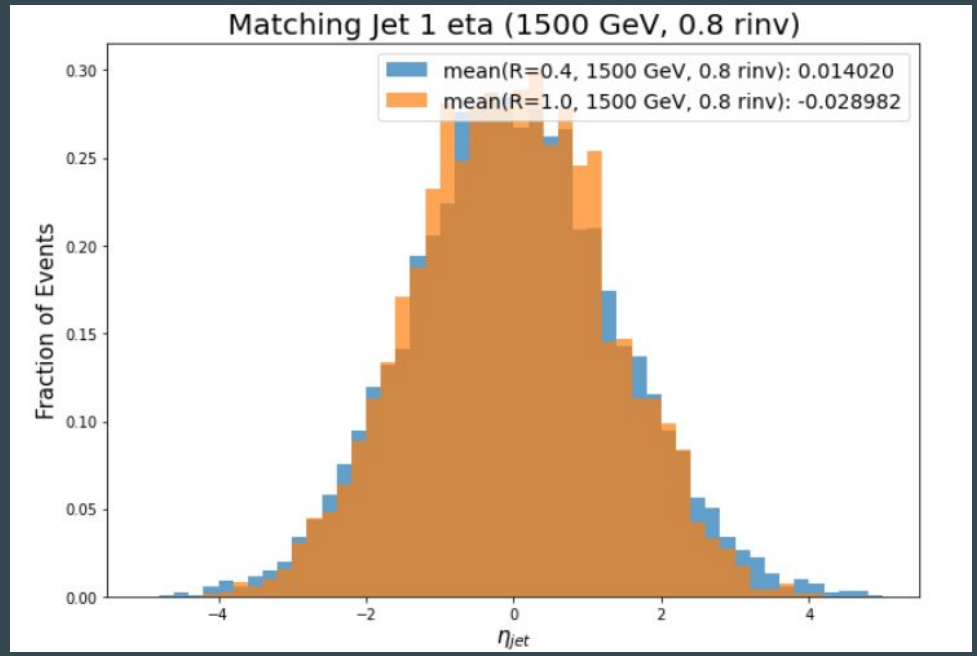
Matching Jet 1 eta



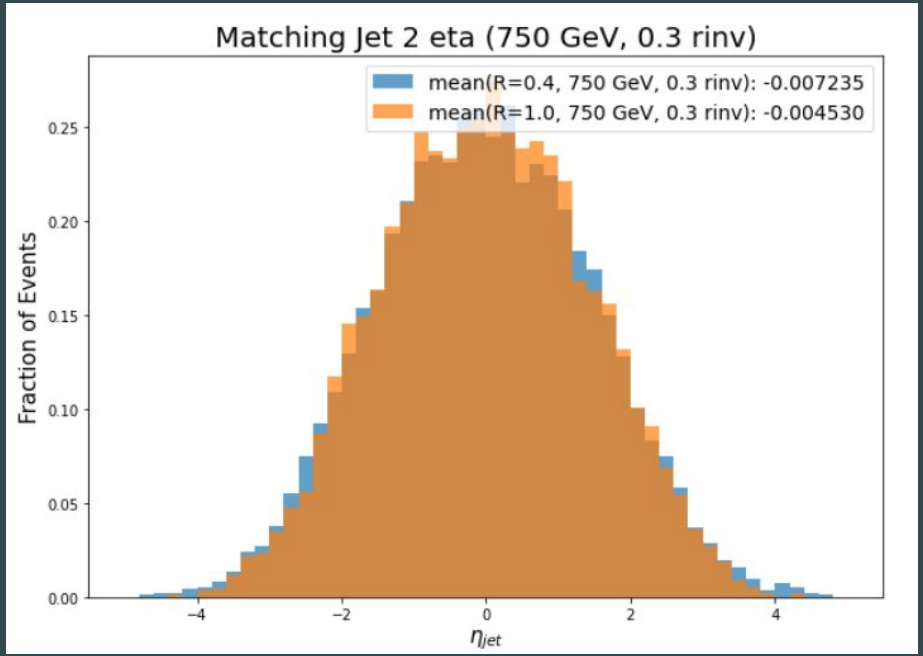


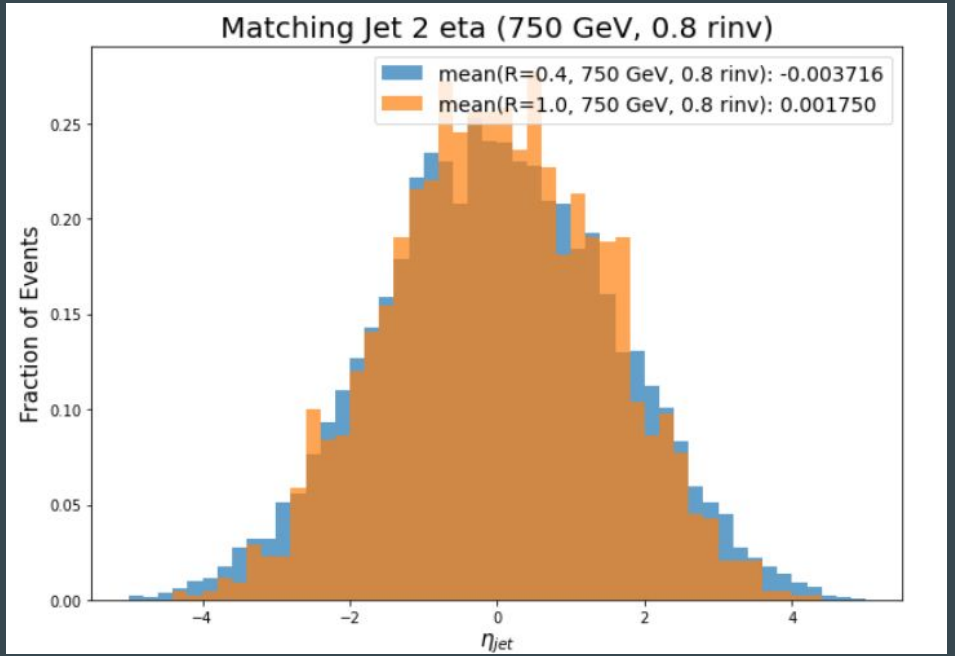
Matching Jet 1 eta



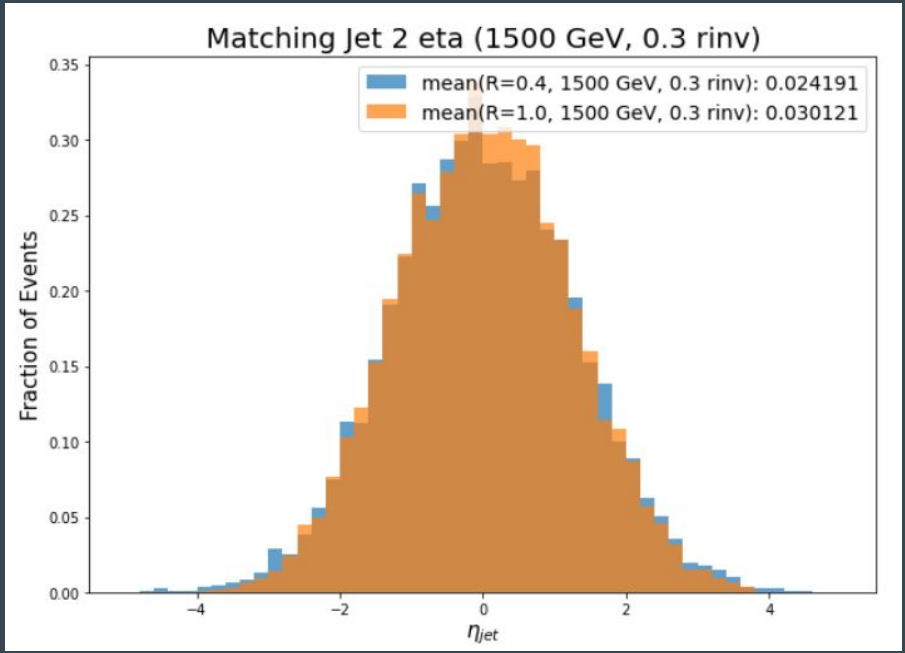


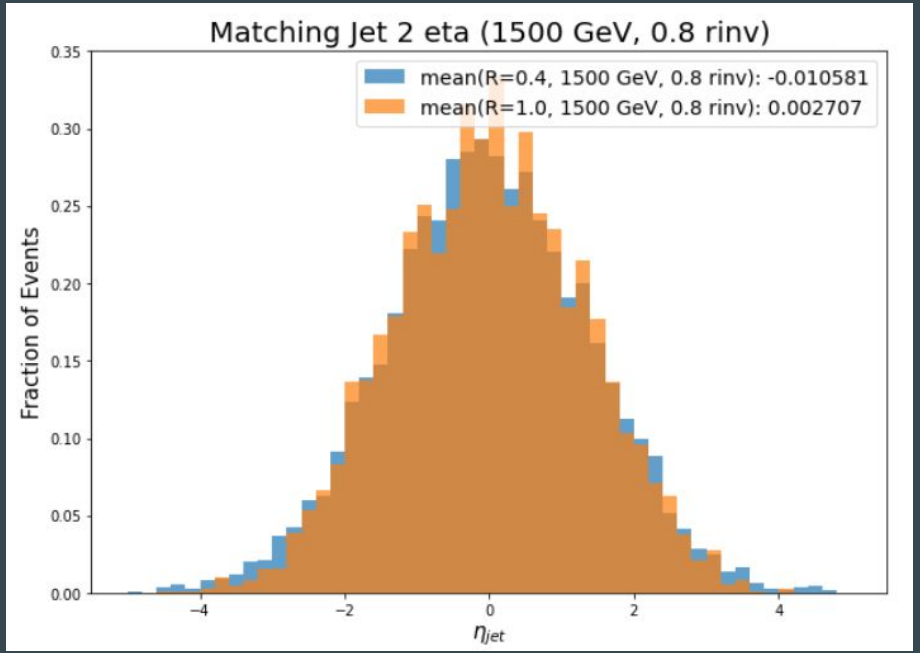
Matching Jet 2 eta



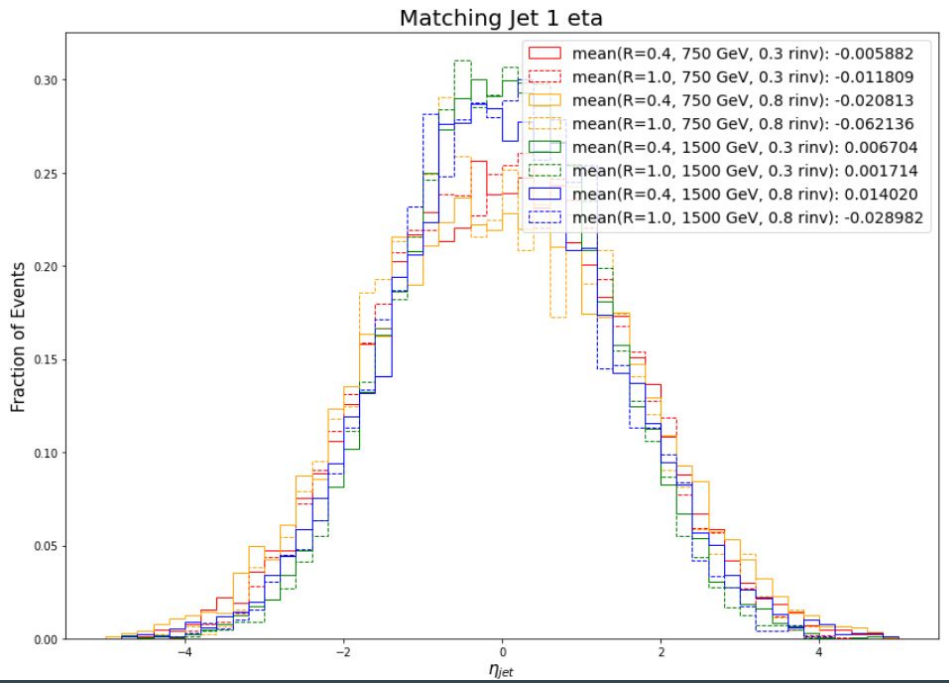


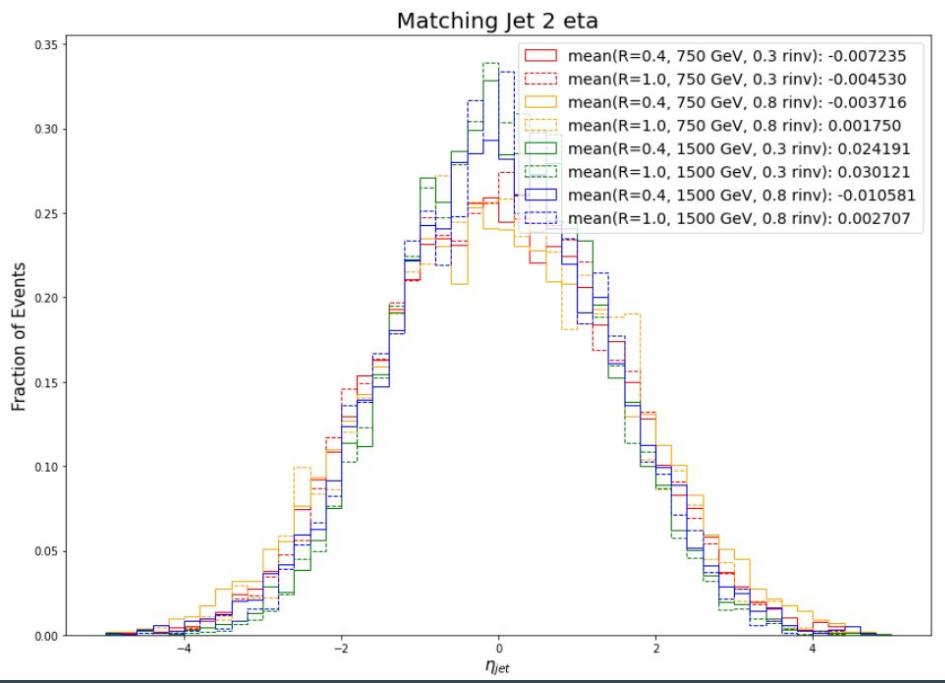
Matching Jet 2 eta



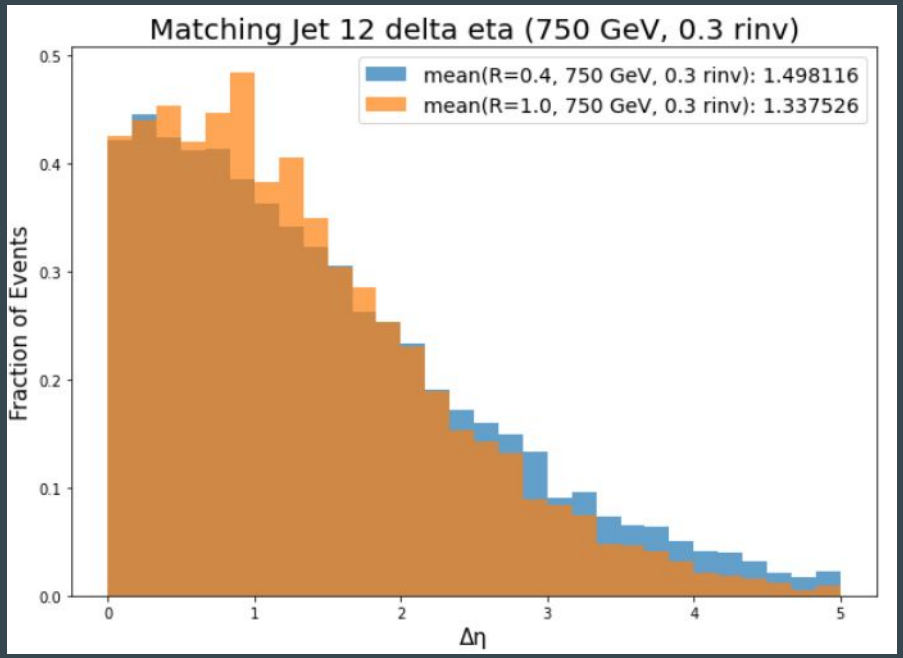


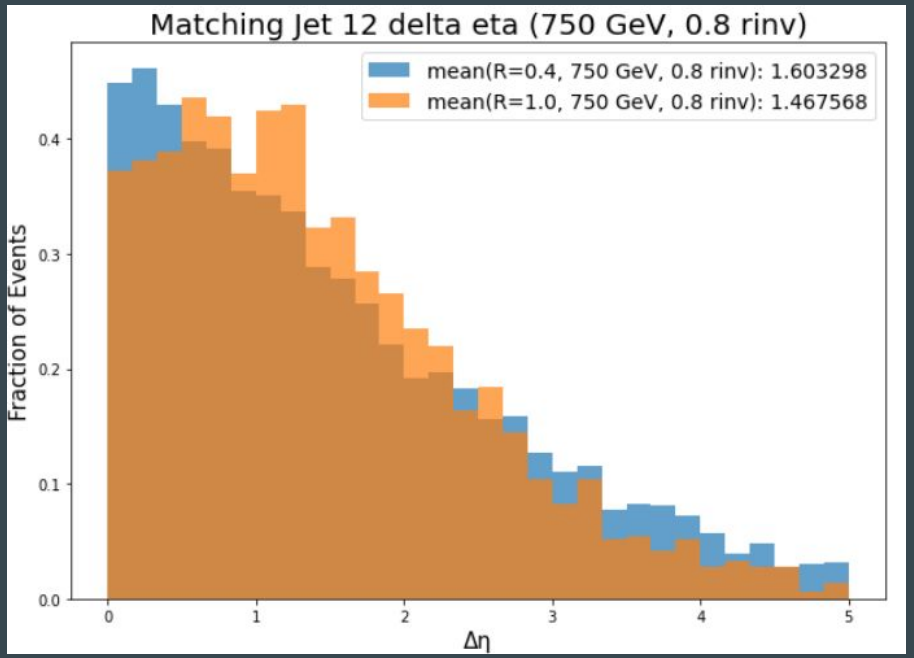
Matching Jet 2 pt



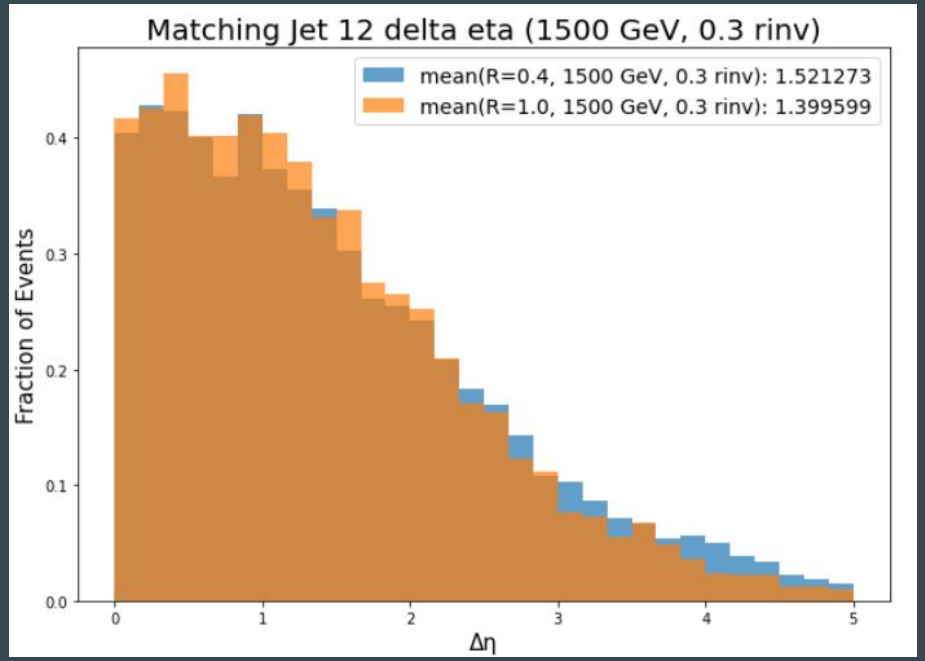


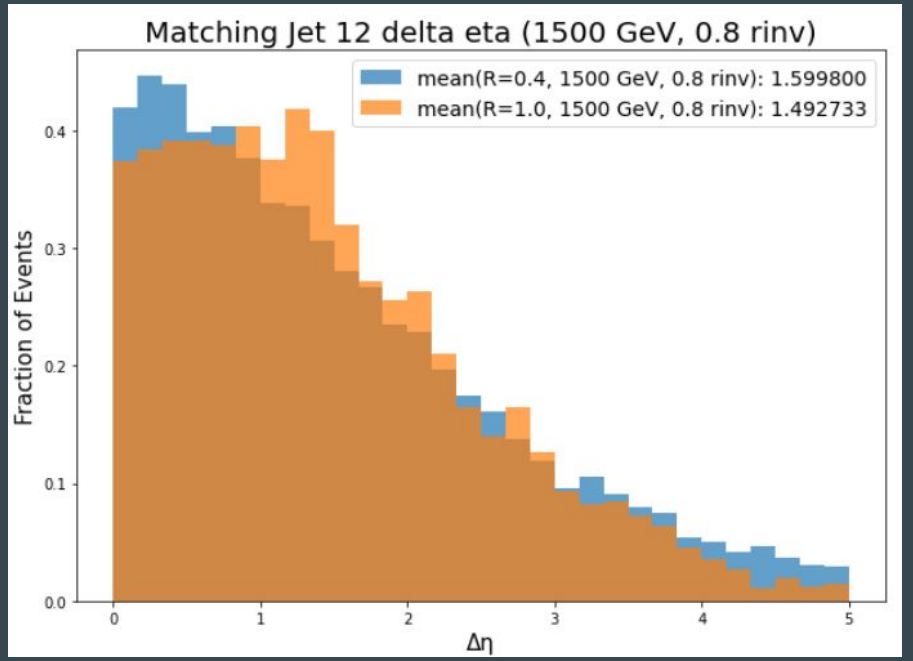
Matching Jet 12 delta eta



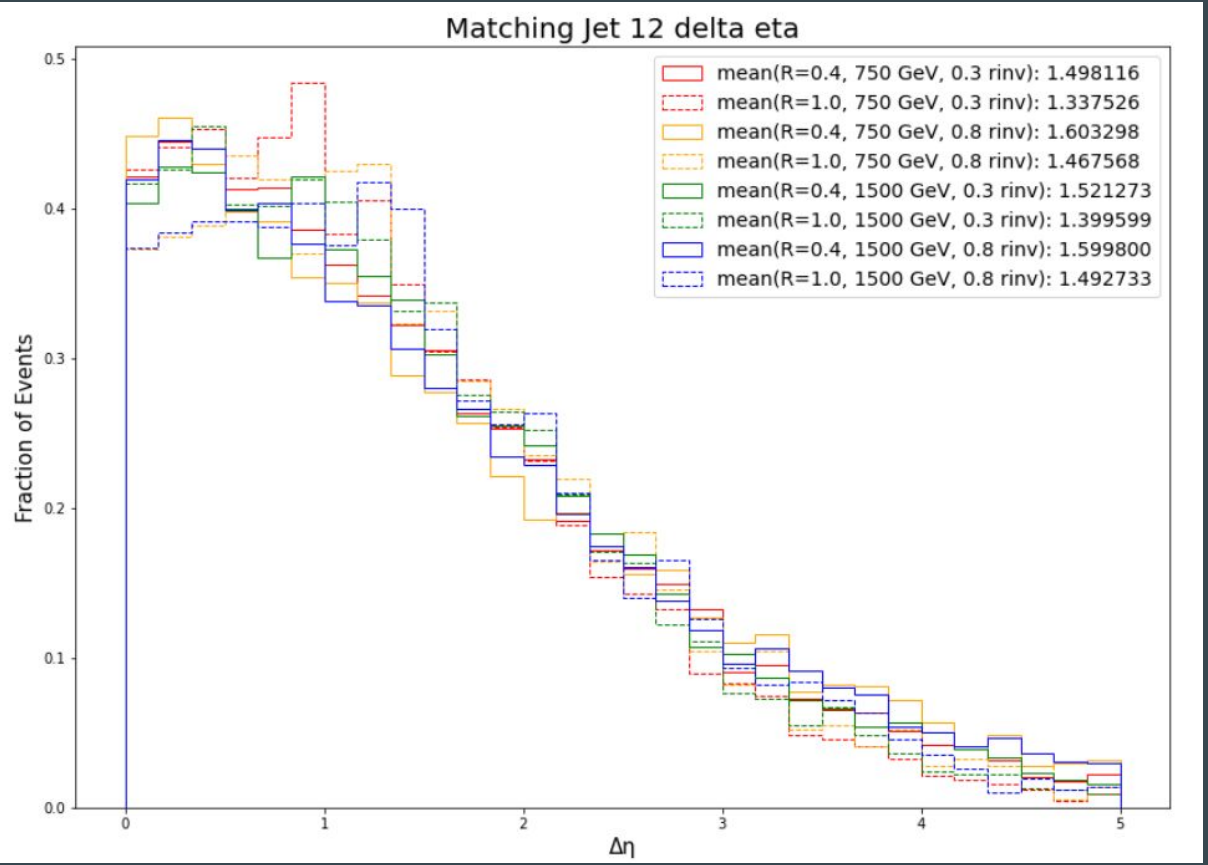


Matching Jet 12 delta eta

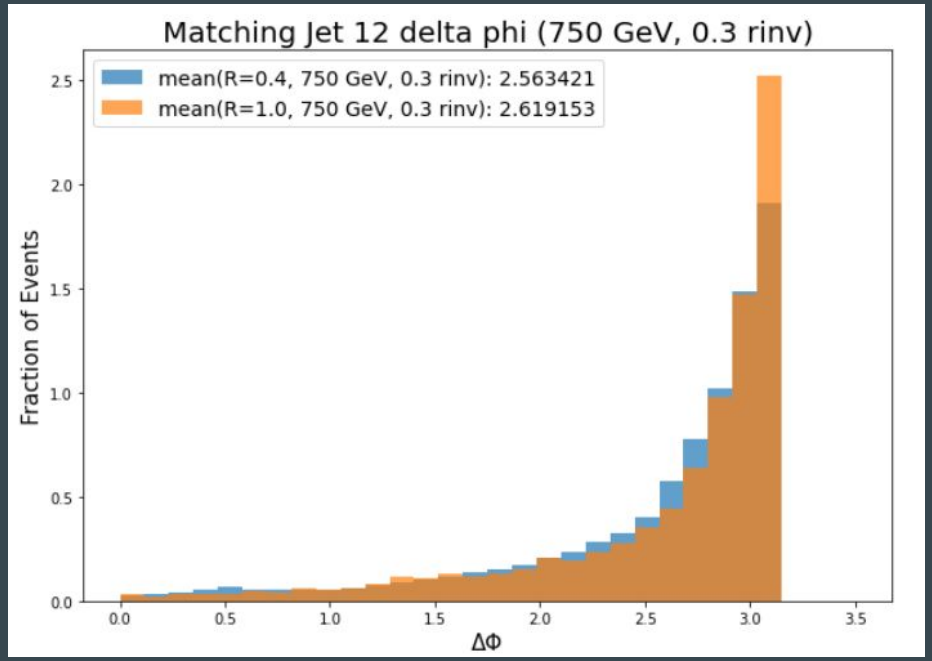


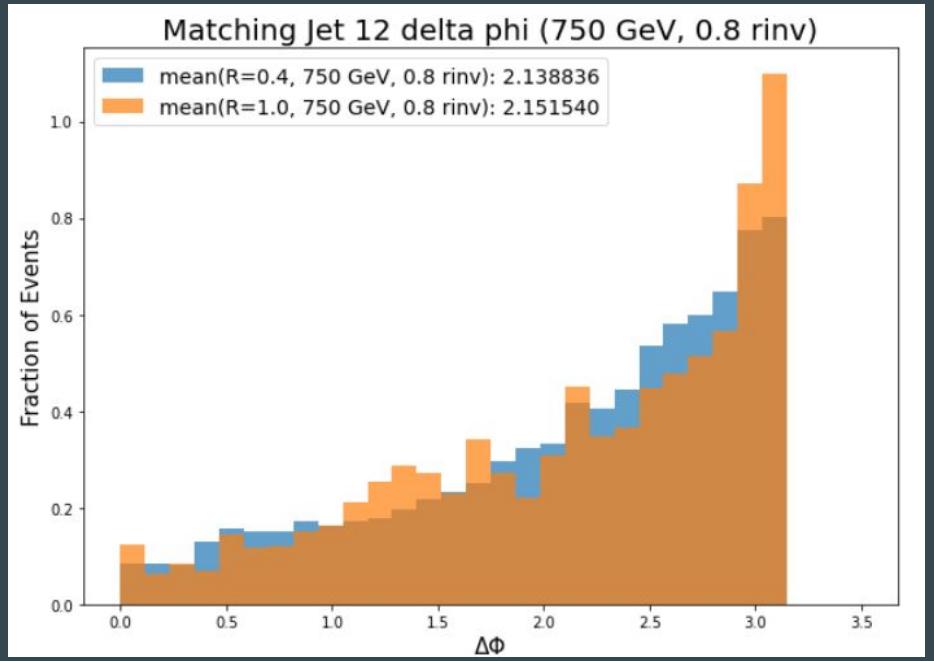


Matching Jet 12 delta eta

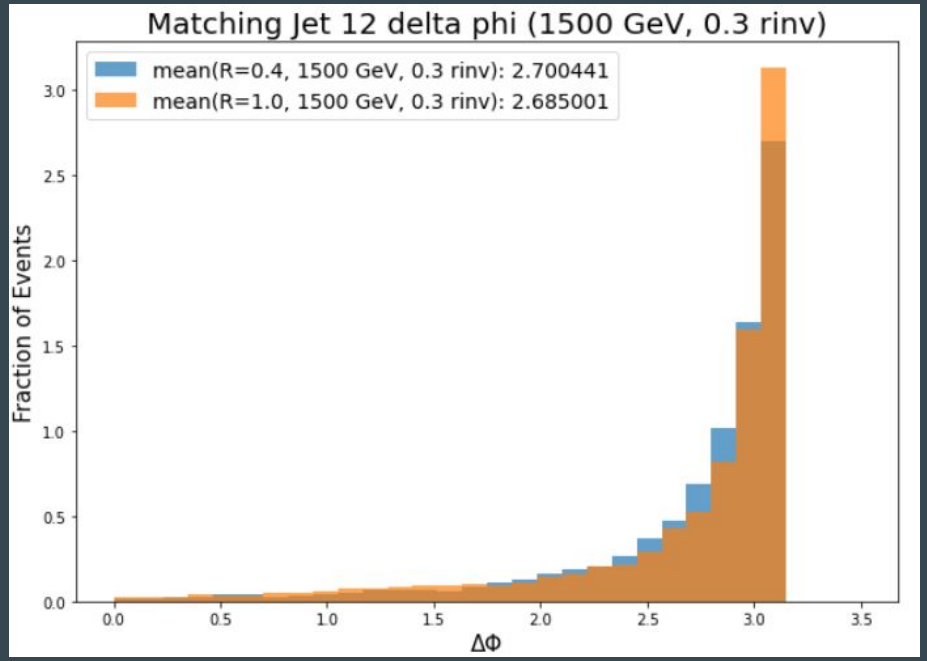


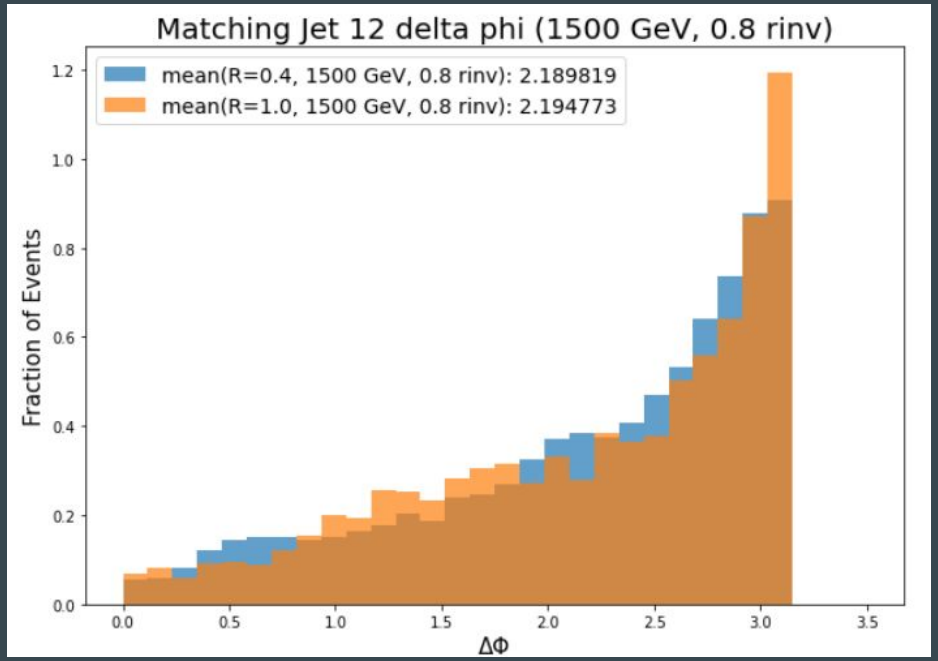
Matching Jet 12 delta phi



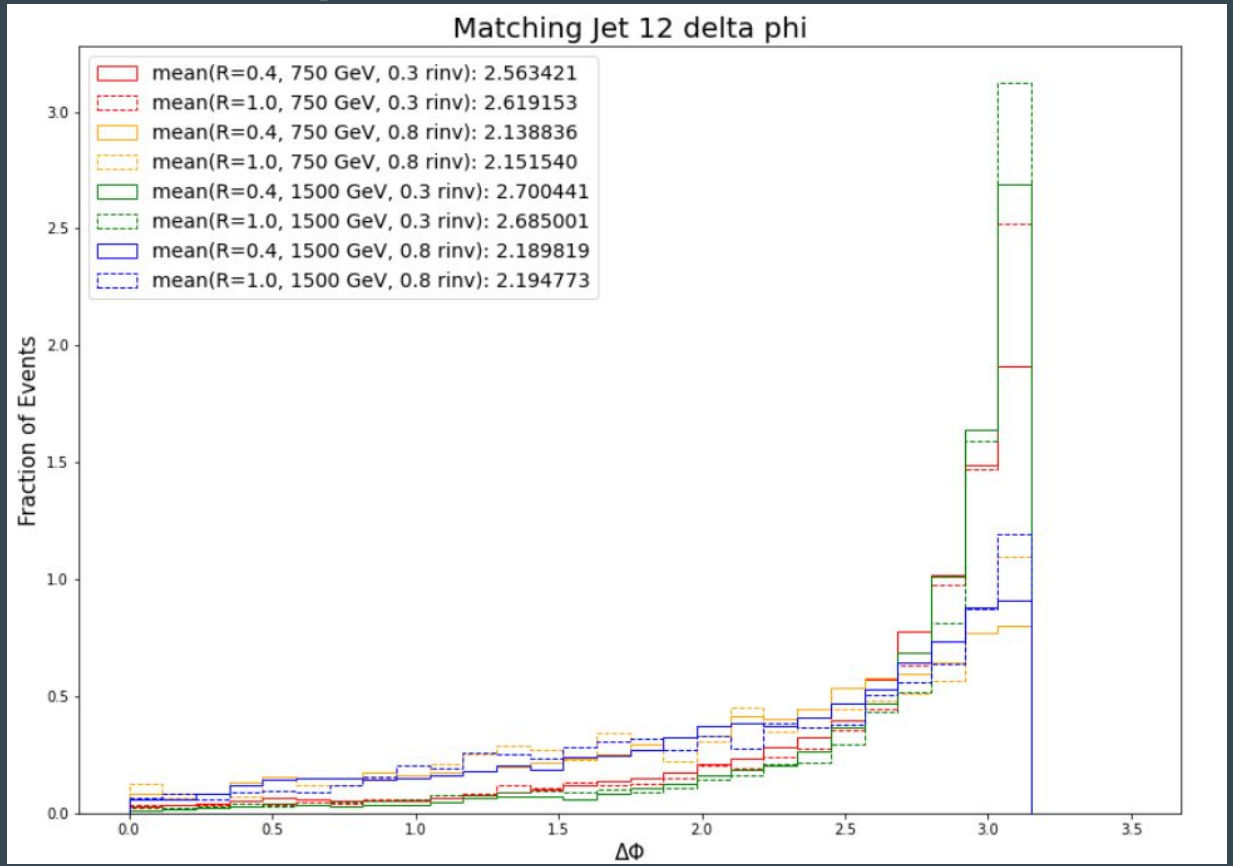


Matching Jet 12 delta phi

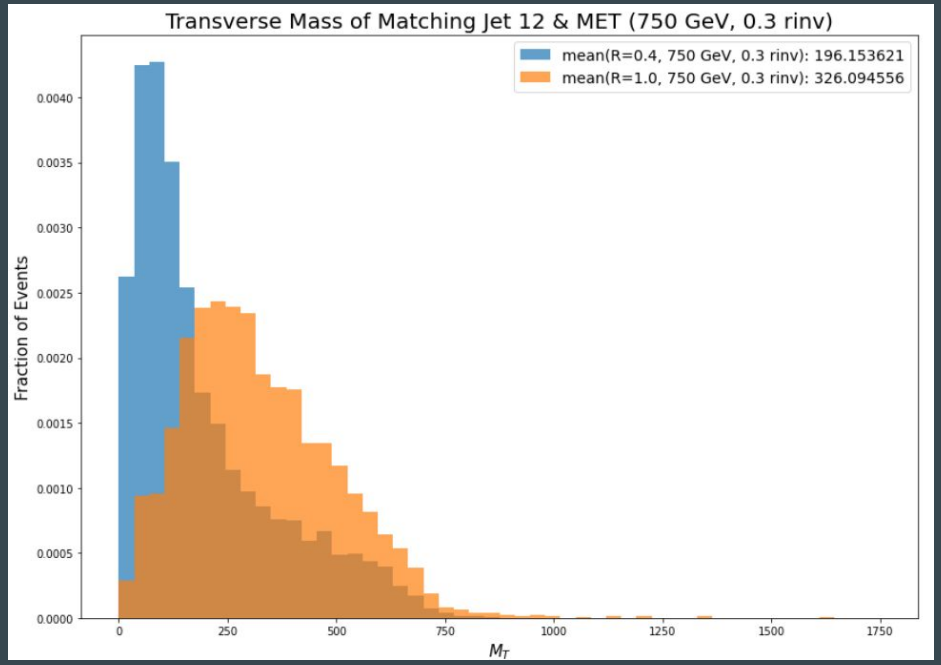


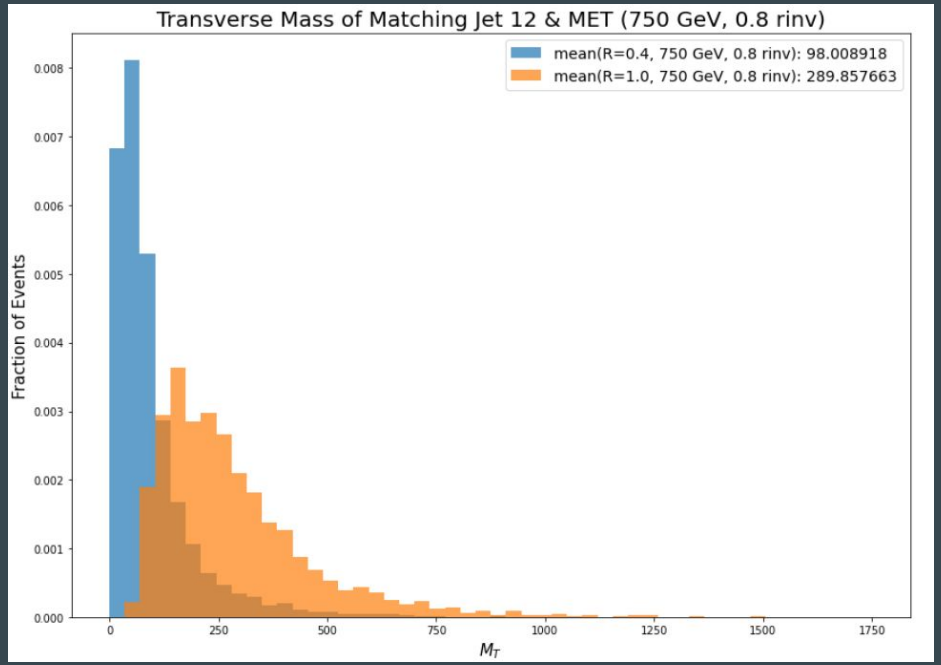


Matching Jet 12 delta phi

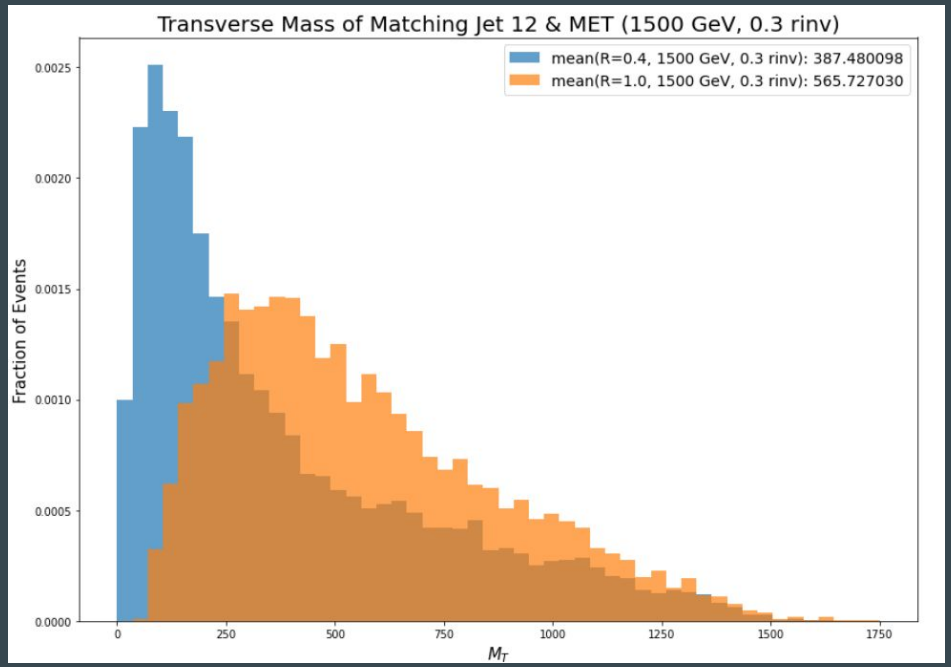


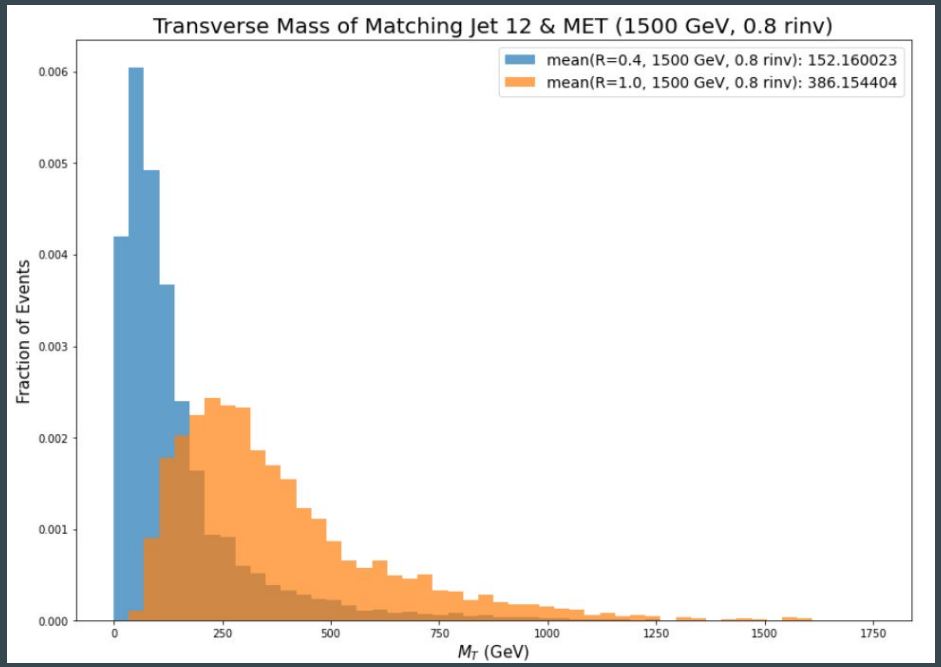
Transverse Mass of Matching Jet 12 & MET



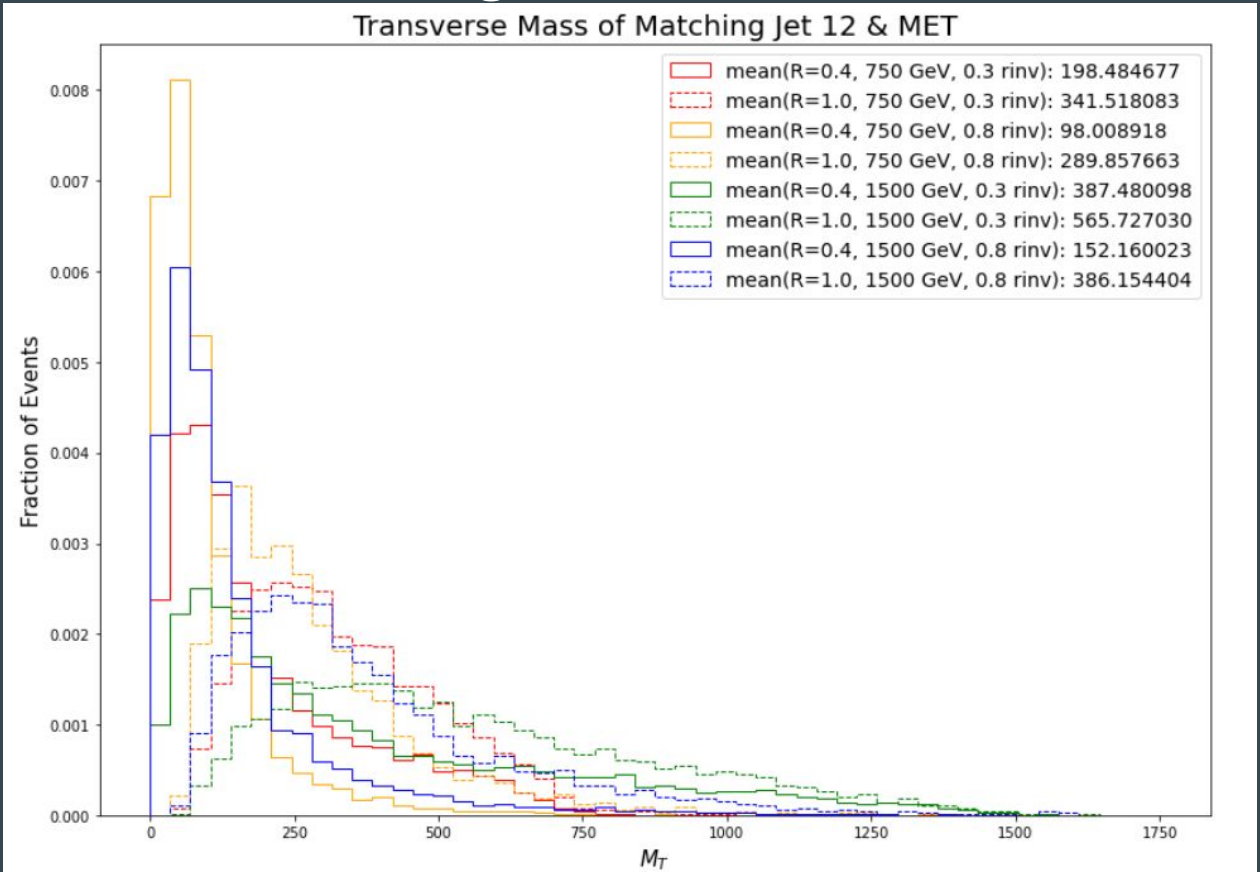


Transverse Mass of Matching Jet 12 & MET

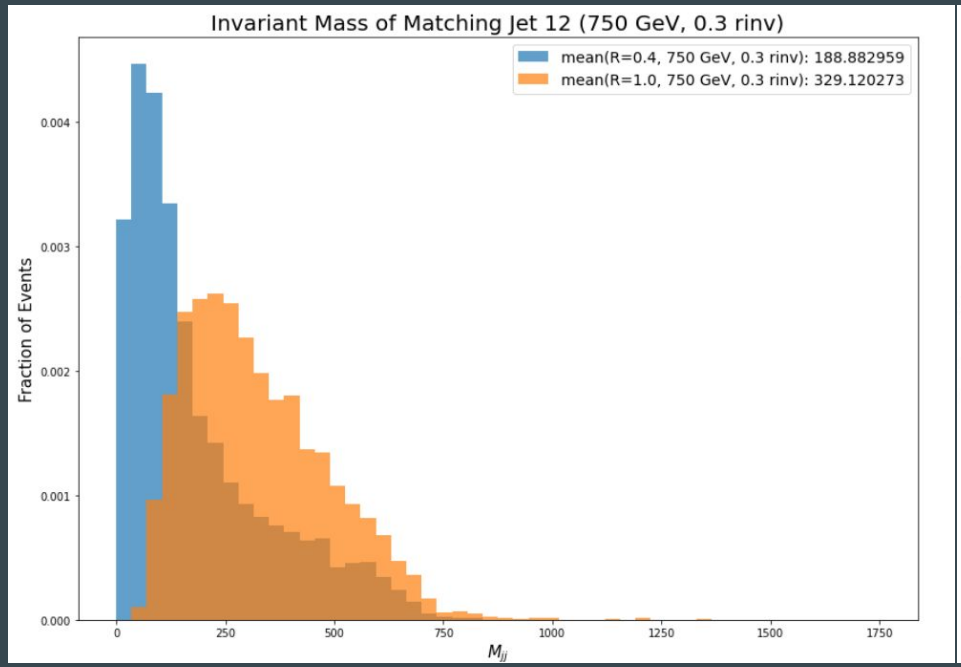


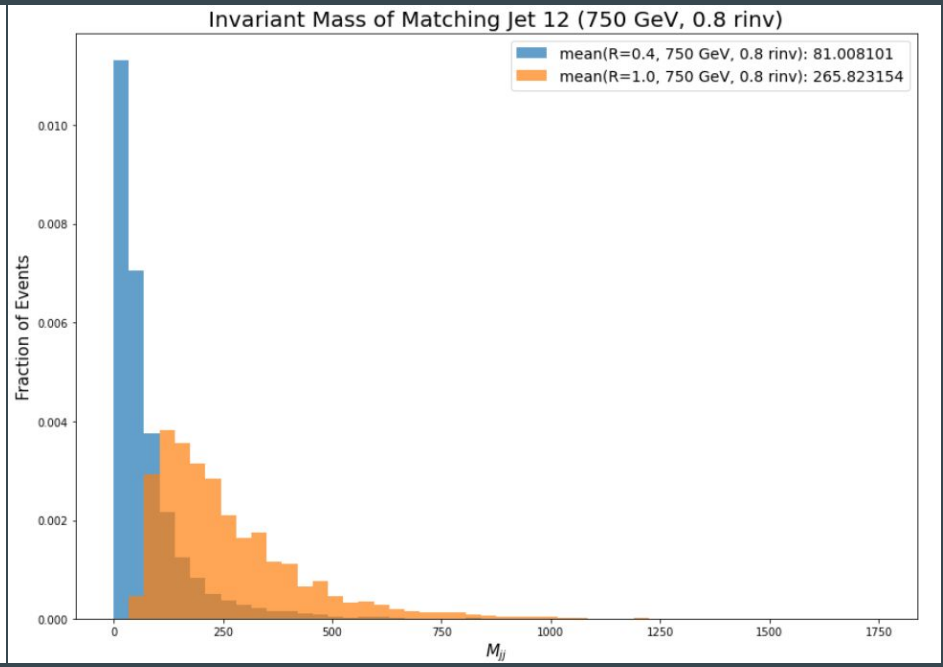


Transverse Mass of Matching Jet 12 & MET

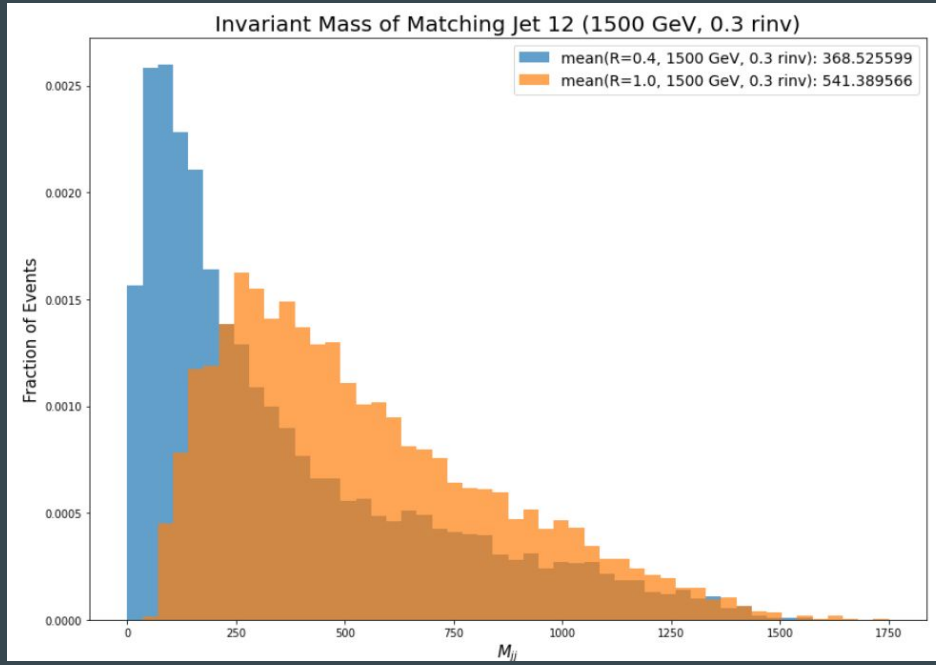


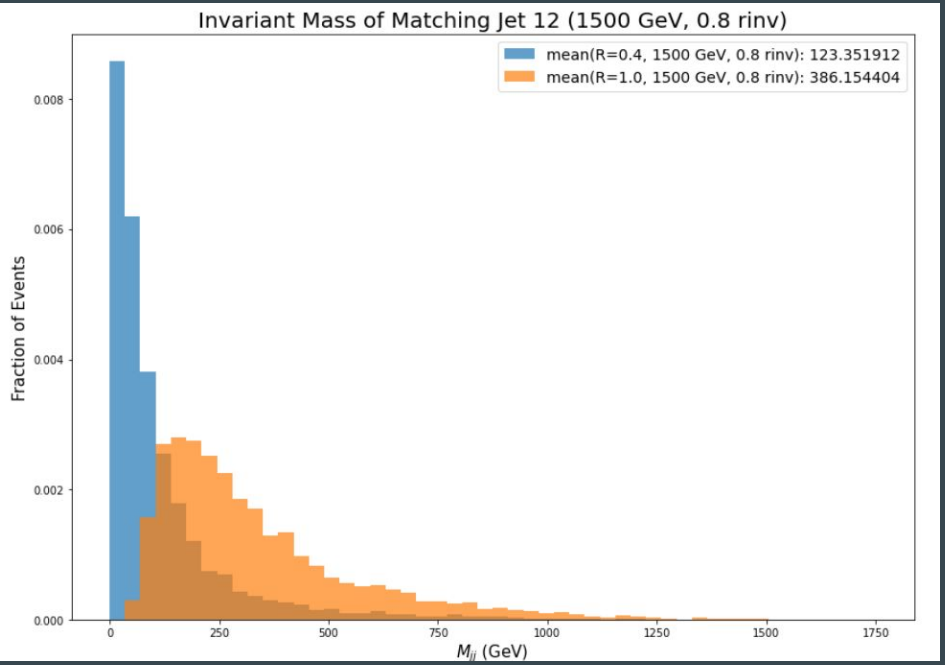
Invariant Mass of Matching Jet 12



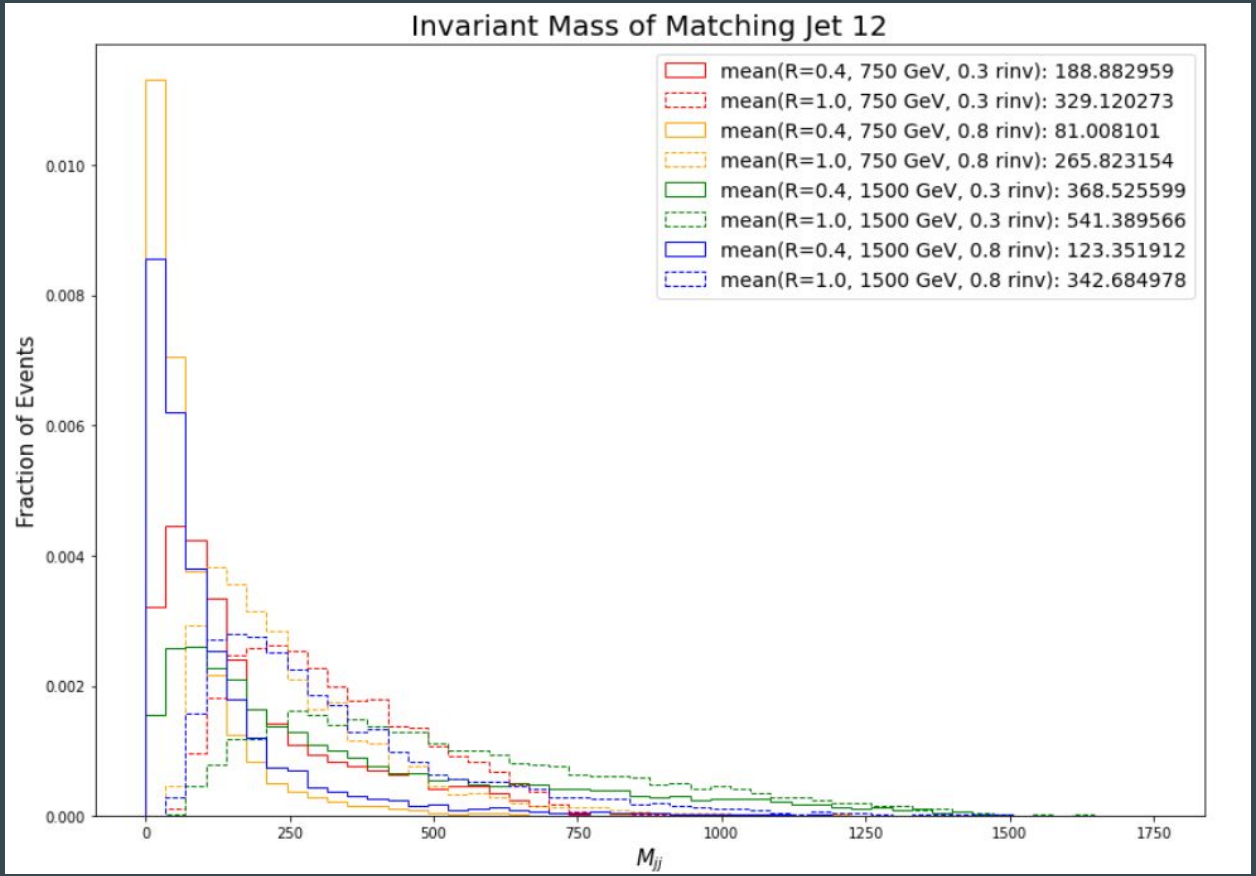


Invariant Mass of Matching Jet 12



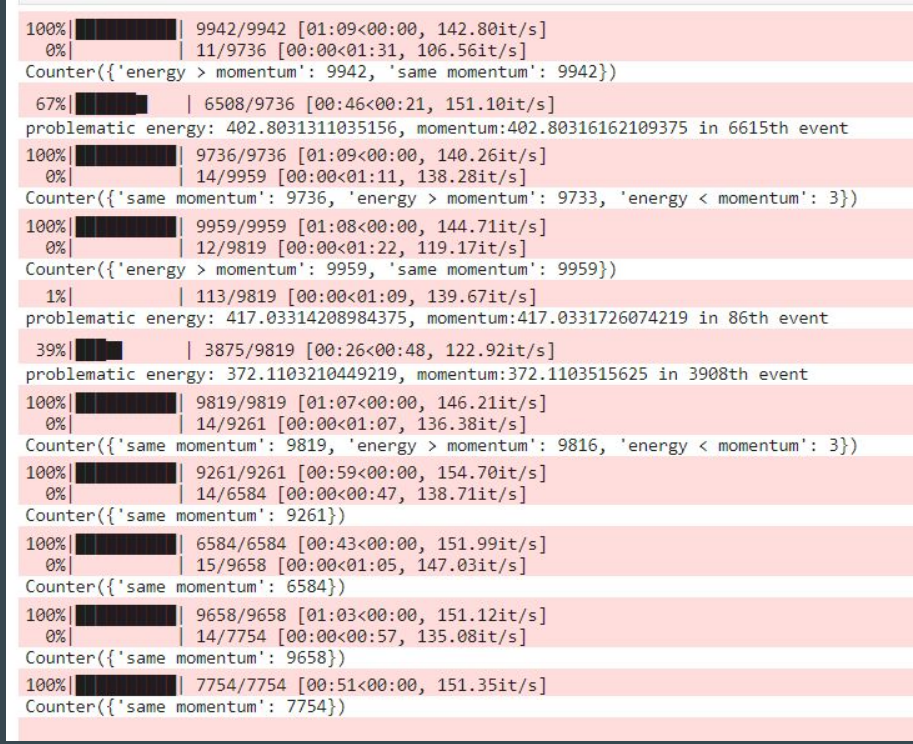


Invariant Mass of Matching Jet 12



Problem on Kinematic Plots:

1. large cut on selection cut/ cut flow table
2. energy is approximately equal to momentum in some events.



Proof: two methods of calculating total momentum are consistent within 10^-4 magnitude. since there is none 'different momentum'.

Proof: there exists jets that has energy approximately equals to momentum (a small difference and it could be python's problem)

Possible Project Idea:

- NN model with Joe
- continue clustering project from Oscar

Personal Notes

...

Able to [rucio get & DAOD -> nTuple]

```
Your proxy is valid until Thu Mar 10 07:18:02 CET 2022
[jlai@lxplus708 SVJ_Data]$ rucio get mc16_13TeV.508547.MGPy8EG_SVJSChan_1500_8.deriv.DAOD_PHYS.e8357_e7400_s3126_r10724_r10726_p4903
2022-03-09 19:18:14,901 INFO    Processing 1 item(s) for input
2022-03-09 19:18:15,205 INFO    No preferred protocol impl in rucio.cfg: No section: 'download'
2022-03-09 19:18:15,206 INFO    No preferred protocol impl in rucio.cfg: No section: 'download'
2022-03-09 19:18:15,206 INFO    No preferred protocol impl in rucio.cfg: No section: 'download'
2022-03-09 19:18:15,206 INFO    No preferred protocol impl in rucio.cfg: No section: 'download'
2022-03-09 19:18:15,232 INFO    Using 3 threads to download 4 files
2022-03-09 19:18:15,233 INFO    Thread 0/3: Preparing download of mc16_13TeV:DAOD_PHYS.27616103._000001.pool.root.1
2022-03-09 19:18:15,234 INFO    Thread 1/3: Preparing download of mc16_13TeV:DAOD_PHYS.27616103._000002.pool.root.1
2022-03-09 19:18:15,235 INFO    Thread 2/3: Preparing download of mc16_13TeV:DAOD_PHYS.27616103._000003.pool.root.1
2022-03-09 19:18:15,306 INFO    Thread 0/3: Trying to download with root and timeout of 1481s from RAL-LCG2-ECHO_DATADISK: mc16_13TeV:DAOD_PHYS.27616103._000001.pool.root.1
2022-03-09 19:18:15,364 INFO    Thread 2/3: Trying to download with root and timeout of 1476s from RAL-LCG2-ECHO_DATADISK: mc16_13TeV:DAOD_PHYS.27616103._000003.pool.root.1
2022-03-09 19:18:15,366 INFO    Thread 1/3: Trying to download with root and timeout of 1477s from RAL-LCG2-ECHO_DATADISK: mc16_13TeV:DAOD_PHYS.27616103._000002.pool.root.1
2022-03-09 19:18:15,483 INFO    Thread 0/3: Using PFN: root://xrootd.echo.stfc.ac.uk:1094/atlas:datadisk/rucio/mc16_13TeV/83/9a/DAOD_PHYS.27616103._000001.pool.root.1
2022-03-09 19:18:15,484 INFO    Thread 2/3: Using PFN: root://xrootd.echo.stfc.ac.uk:1094/atlas:datadisk/rucio/mc16_13TeV/d8/17/DAOD_PHYS.27616103._000003.pool.root.1
2022-03-09 19:18:15,485 INFO    Thread 1/3: Using PFN: root://xrootd.echo.stfc.ac.uk:1094/atlas:datadisk/rucio/mc16_13TeV/b7/ed/DAOD_PHYS.27616103._000002.pool.root.1
2022-03-09 19:21:16,053 INFO    Thread 2/3: File mc16_13TeV:DAOD_PHYS.27616103._000003.pool.root.1 successfully downloaded. 708.014 MB in 141.36 seconds = 5.01 MBps
2022-03-09 19:21:16,053 INFO    Thread 2/3: Preparing download of mc16_13TeV:DAOD_PHYS.27616103._000004.pool.root.1
2022-03-09 19:21:16,054 INFO    Thread 2/3: Trying to download with root and timeout of 538s from RAL-LCG2-ECHO_DATADISK: mc16_13TeV:DAOD_PHYS.27616103._000004.pool.root.1
2022-03-09 19:21:16,059 INFO    Thread 0/3: File mc16_13TeV:DAOD_PHYS.27616103._000001.pool.root.1 successfully downloaded. 710.977 MB in 141.36 seconds = 5.03 MBps
2022-03-09 19:21:16,064 INFO    Thread 2/3: Using PFN: root://xrootd.echo.stfc.ac.uk:1094/atlas:datadisk/rucio/mc16_13TeV/f0/ce/DAOD_PHYS.27616103._000004.pool.root.1
2022-03-09 19:21:16,073 INFO    Thread 1/3: File mc16_13TeV:DAOD_PHYS.27616103._000002.pool.root.1 successfully downloaded. 708.572 MB in 113.61 seconds = 6.24 MBps
2022-03-09 19:21:36,565 INFO    Thread 2/3: File mc16_13TeV:DAOD_PHYS.27616103._000004.pool.root.1 successfully downloaded. 239.230 MB in 20.05 seconds = 11.93 MBps
----------------------------------
Download summary
----------------------------------------
DID mc16_13TeV:mc16_13TeV.508547.MGPy8EG_SVJSChan_1500_8.deriv.DAOD_PHYS.e8357_e7400_s3126_r10724_r10726_p4903
Total files (DID):                      4
Total files (filtered):                 4
Downloaded files:                       4
Files already found locally:            0
Files that cannot be downloaded:        0
[jlai@lxplus708 SVJ_Data]$ ls
mc16_13TeV
mc16_13TeV.508547.MGPy8EG_SVJSChan_1500_8.deriv.DAOD_PHYS.e8357_e7400_s3126_r10724_r10726_p4903
mc16_13TeV.508549.MGPy8EG_SVJSChan_750_8.deriv.DAOD_PHYS.e8357_e7400_s3126_r10201_r10210_p4903
[jlai@lxplus708 SVJ_Data]$
```

Status Codes

2.1.2 Status codes

When a new particle is added to the event record, it is assigned a positive status code that describes why it has been added, as follows:

code range	explanation
11 – 19	beam particles
21 – 29	particles of the hardest subprocess
31 – 39	particles of subsequent subprocesses in multiparton interactions
41 – 49	particles produced by initial-state-showers
51 – 59	particles produced by final-state-showers
61 – 69	particles produced by beam-remnant treatment
71 – 79	partons in preparation of hadronization process
81 – 89	primary hadrons produced by hadronization process
91 – 99	particles produced in decay process, or by Bose-Einstein effects