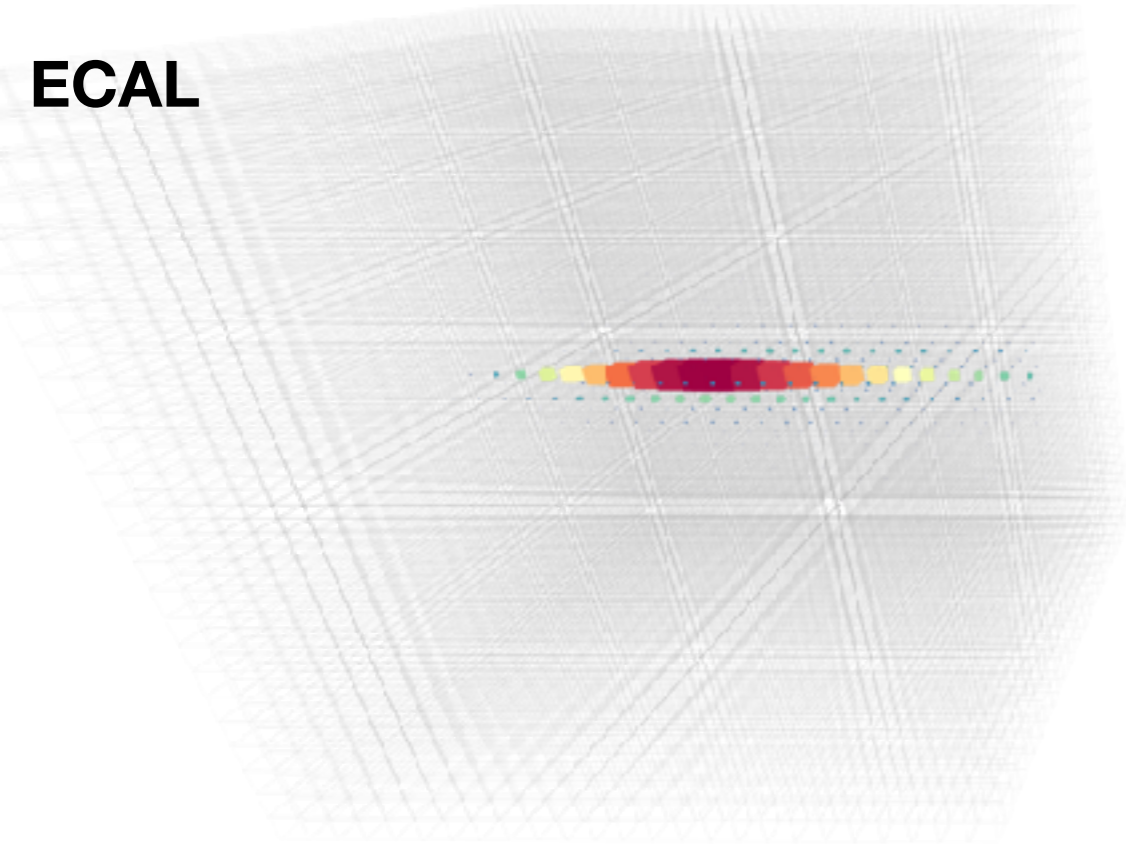


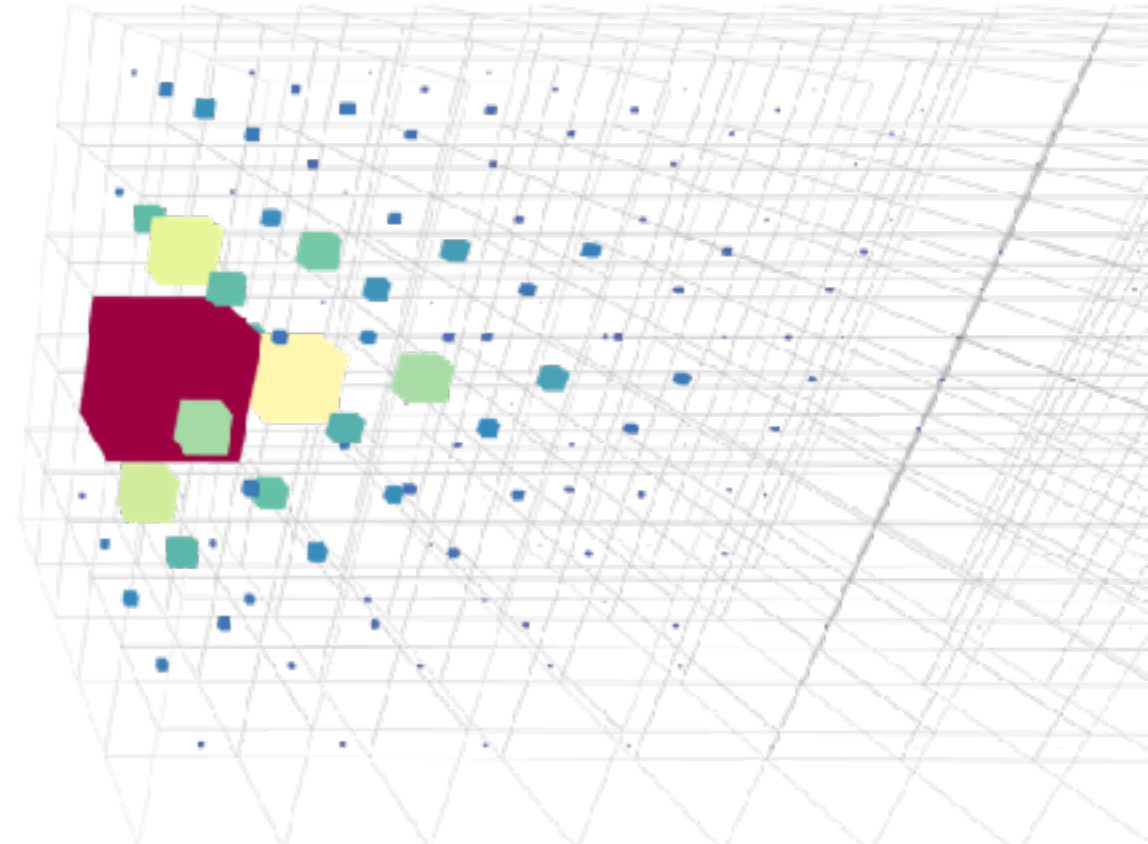
Electron vs. charged pion classifiers

Wei Wei

University of Illinois at Urbana-Champaign

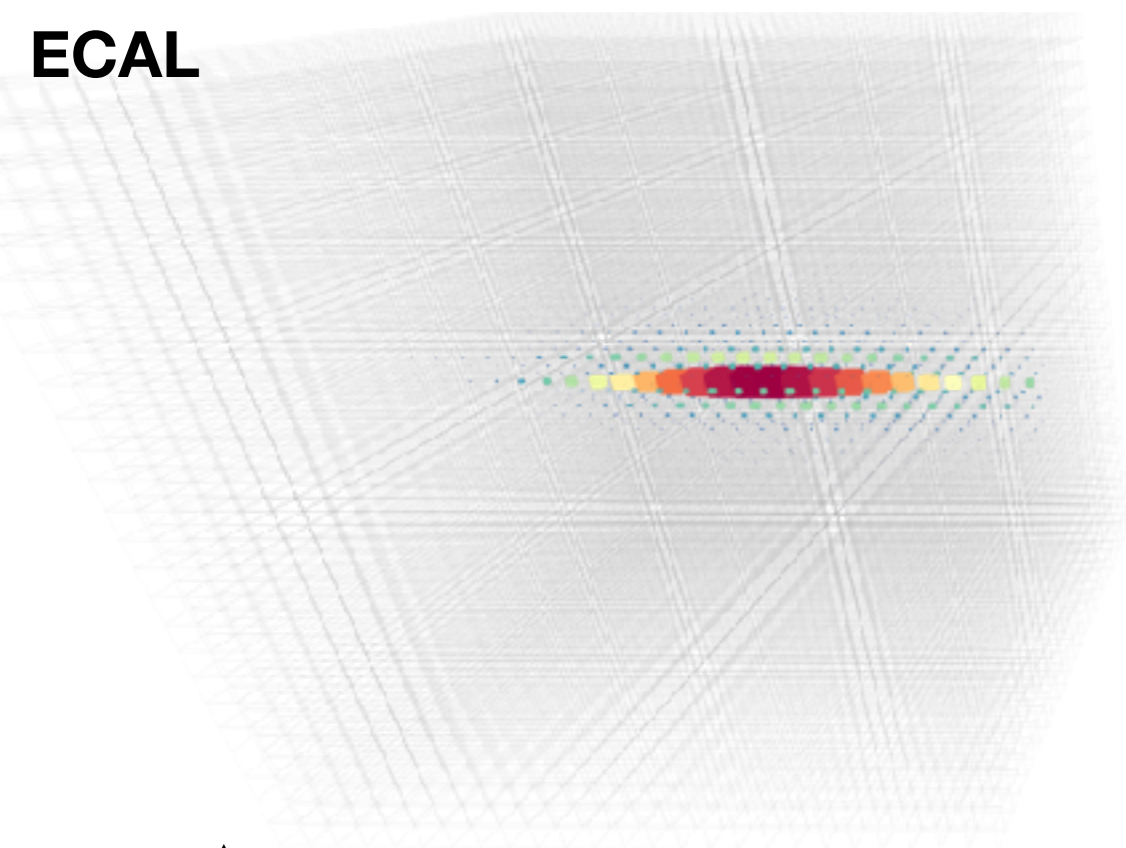


Electron

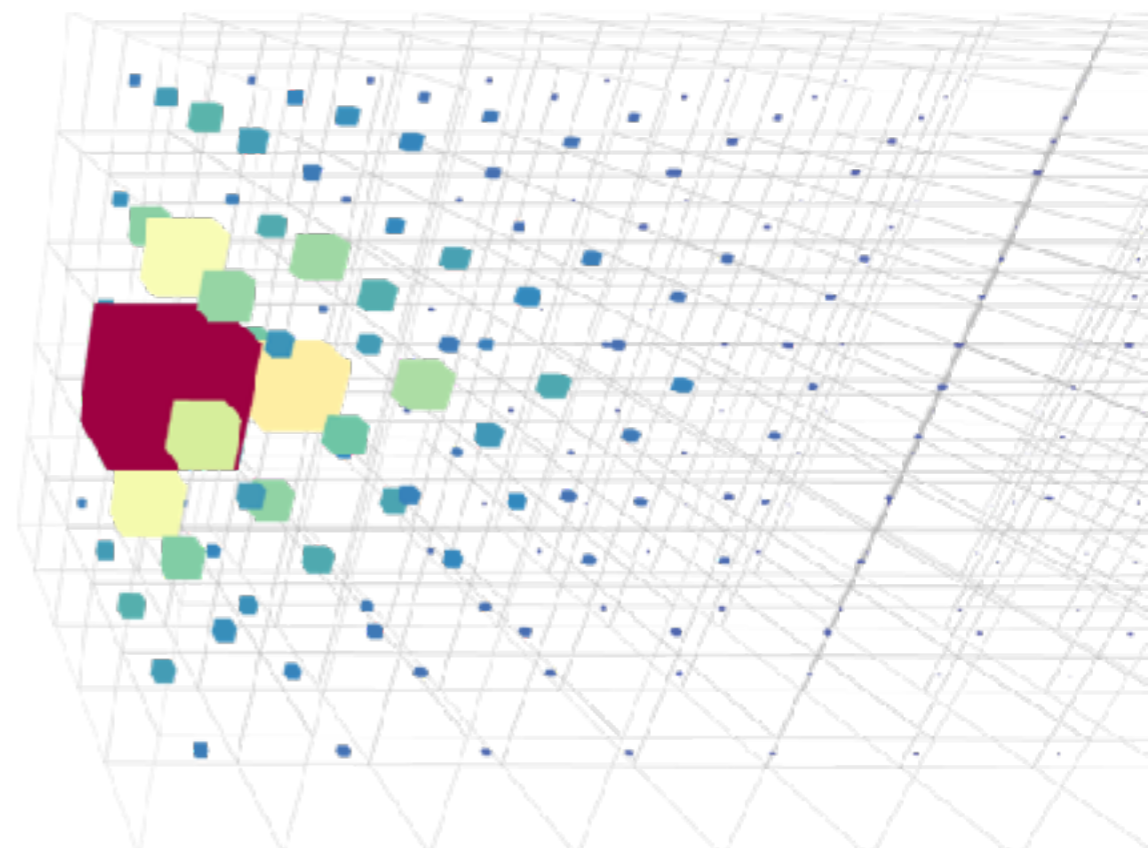


HCAL

vs.

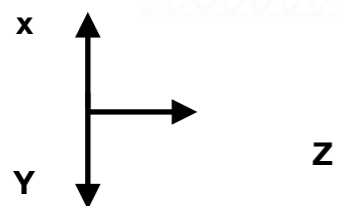


Charged pion



HCAL

Both averaged over 10K events



BDT Baseline

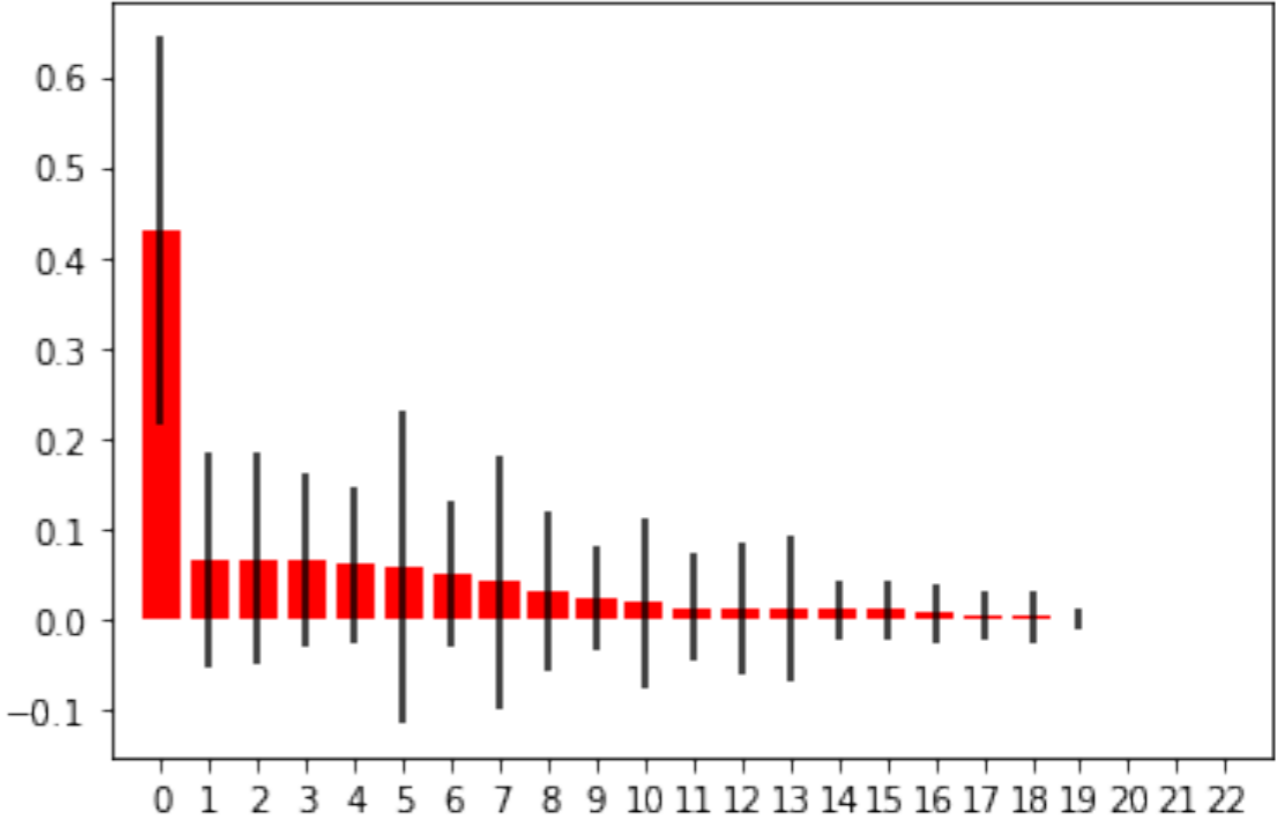
50K electron events and 50K charge pion events

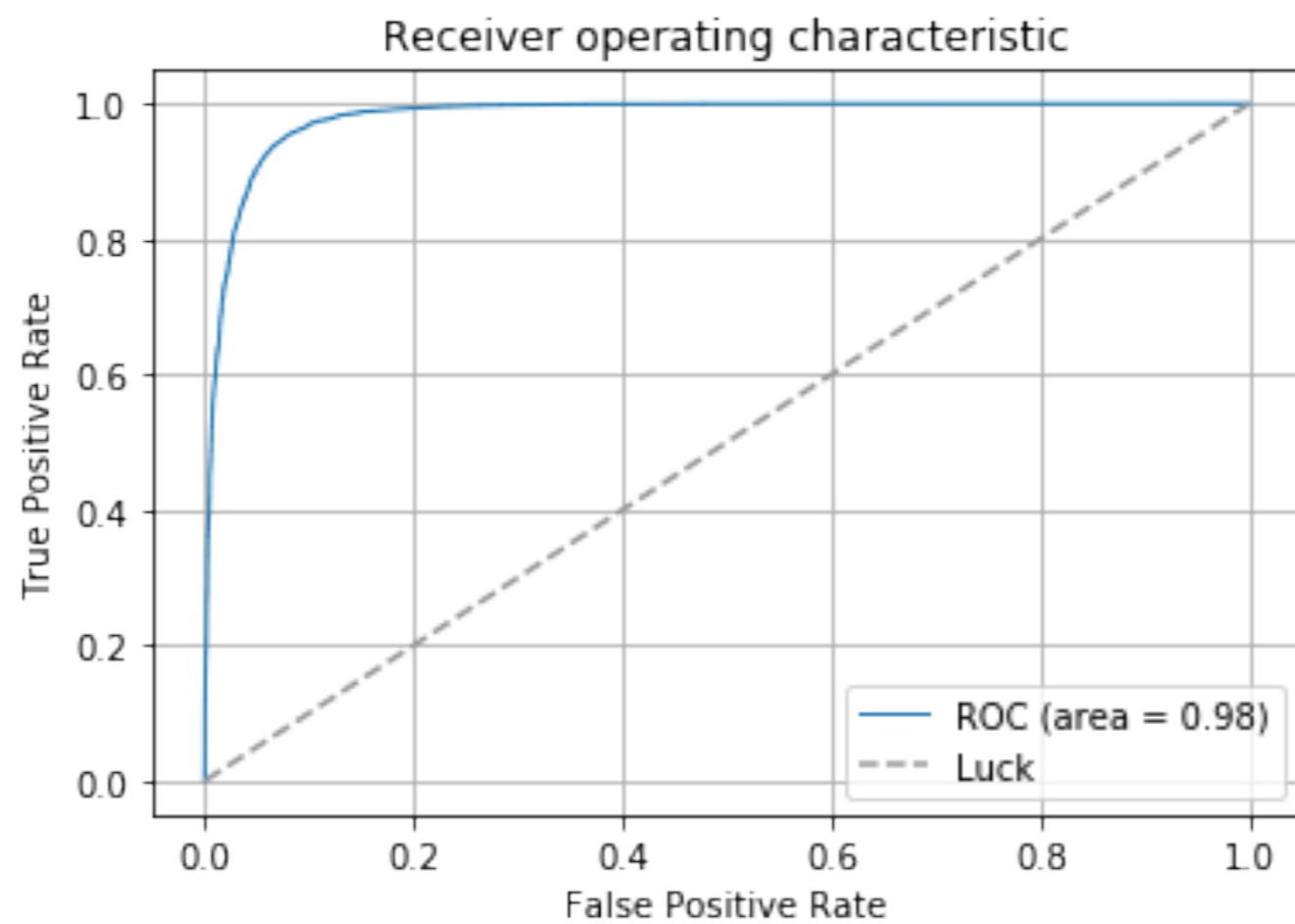
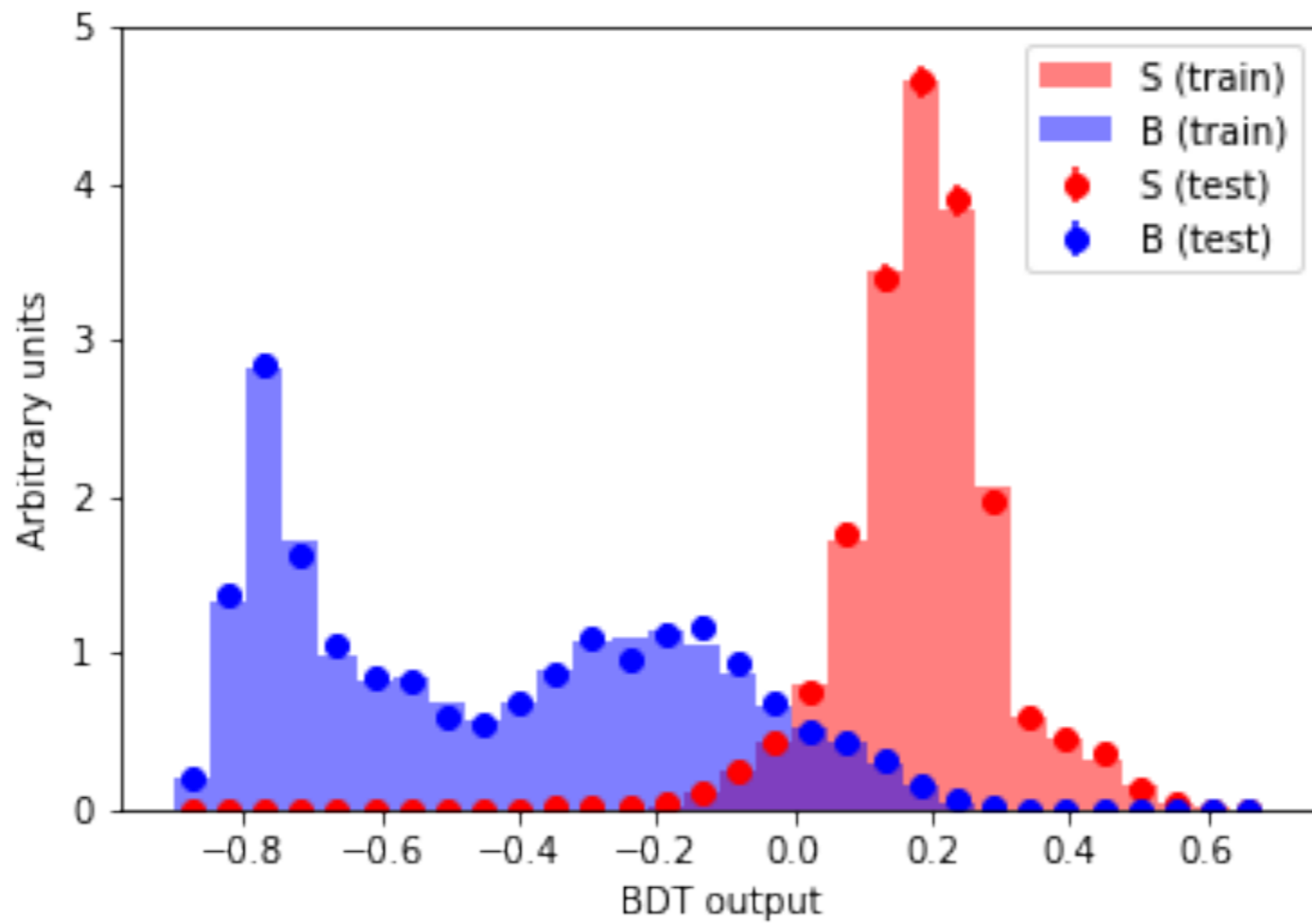
Feature ranking:

1. ECALmomentY5 (0.429168)
2. ECAL_E (0.066955)
3. ECALmomentZ1 (0.066536)
4. ECALmomentX1 (0.066107)
5. HCAL_nHits (0.061692)
6. ECAL_nHits (0.058765)
7. ECALmomentX5 (0.051292)
8. ECALmomentY1 (0.041413)
9. ECAL_ratioFirstLayerToTotalE (0.032202)
10. HCAL_ECAL_ERatio (0.025125)
11. HCAL_E (0.018723)
12. ECALmomentY2 (0.014353)
13. ECALmomentX2 (0.014088)
14. ECALmomentX4 (0.013422)
15. ECALmomentY3 (0.011474)
16. ECALmomentY4 (0.011446)
17. HCAL_ratioFirstLayerToTotalE (0.008055)
18. ECALmomentX3 (0.004335)
19. ECALmomentZ2 (0.003661)
20. ECALmomentZ3 (0.001188)
21. ECALmomentZ4 (0.000000)
22. ECALmomentZ5 (0.000000)
23. HCAL_ECAL_nHitsRatio (0.000000)

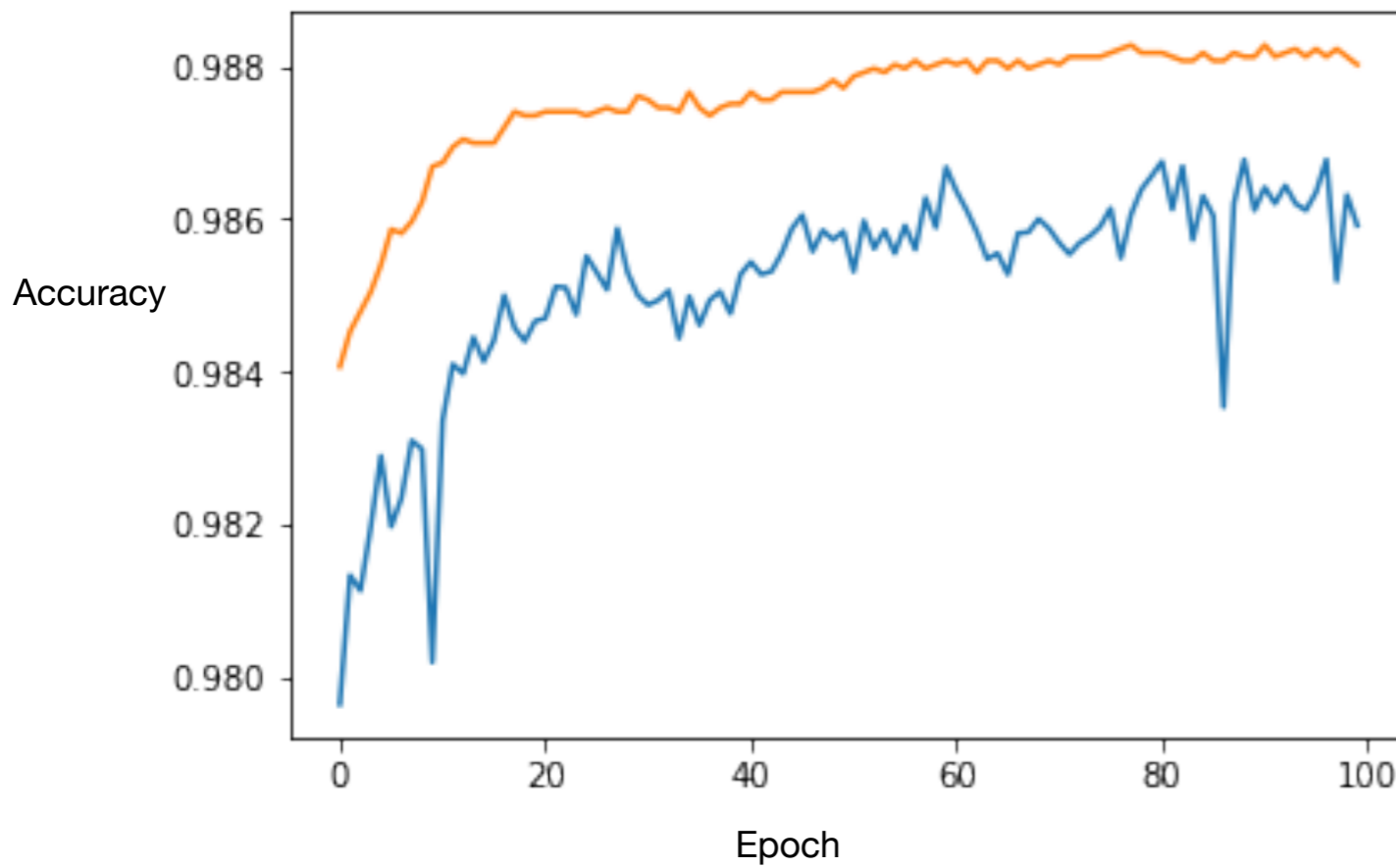
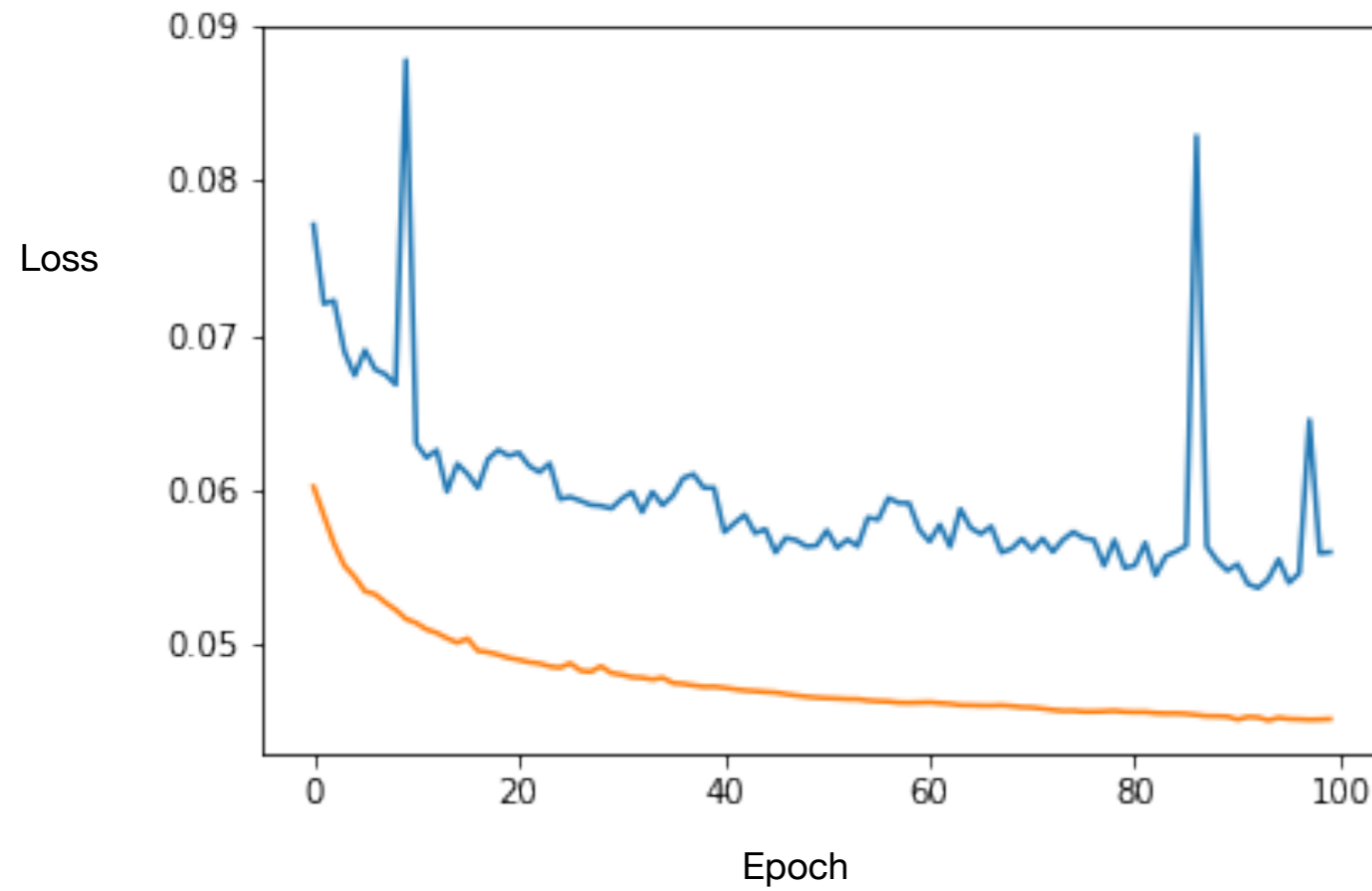
	precision	recall	f1-score
support			
charged pion	0.95	0.92	0.94
7934			
electron	0.92	0.95	0.94
7995			
avg / total	0.94	0.94	0.94
15929			

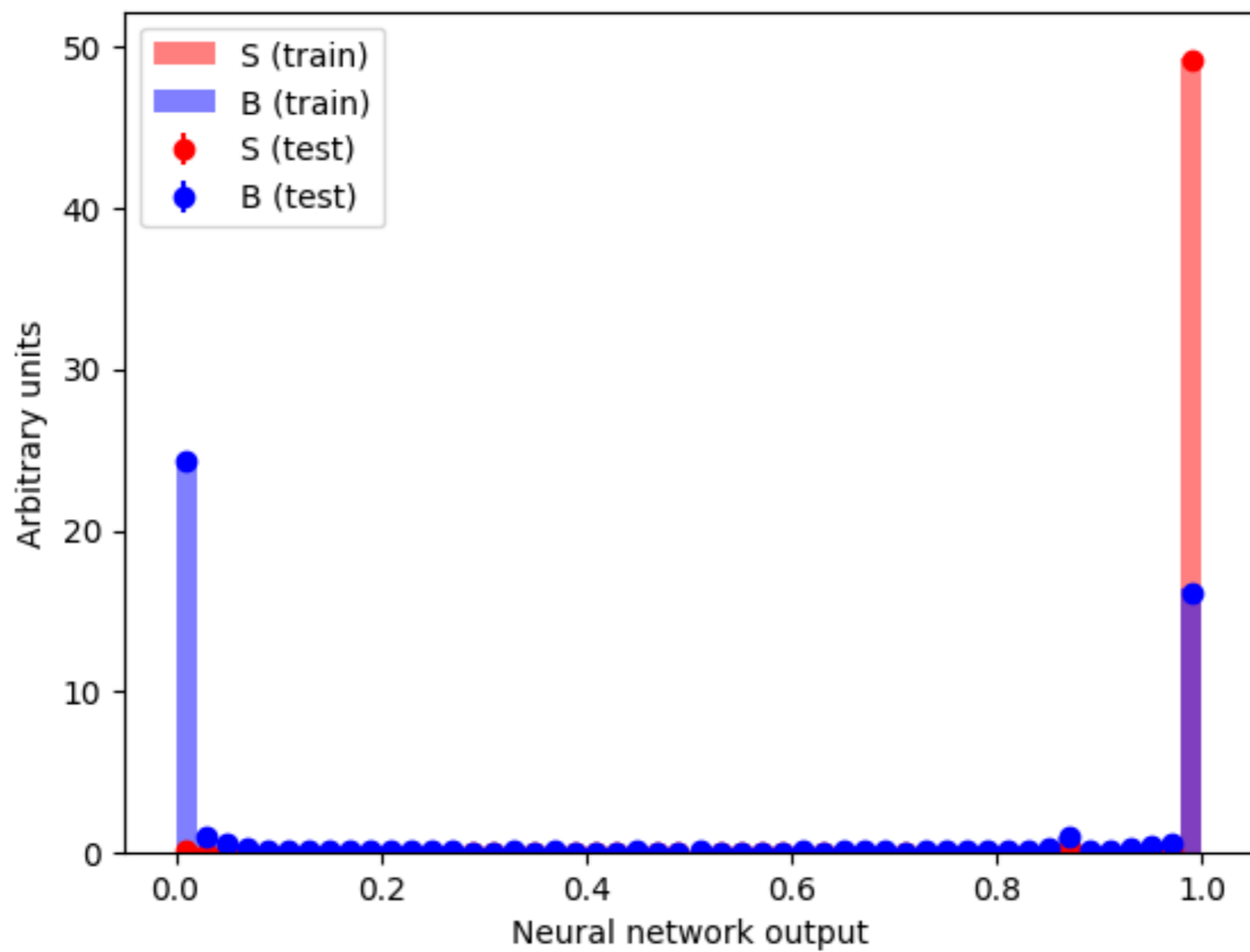
Feature importances

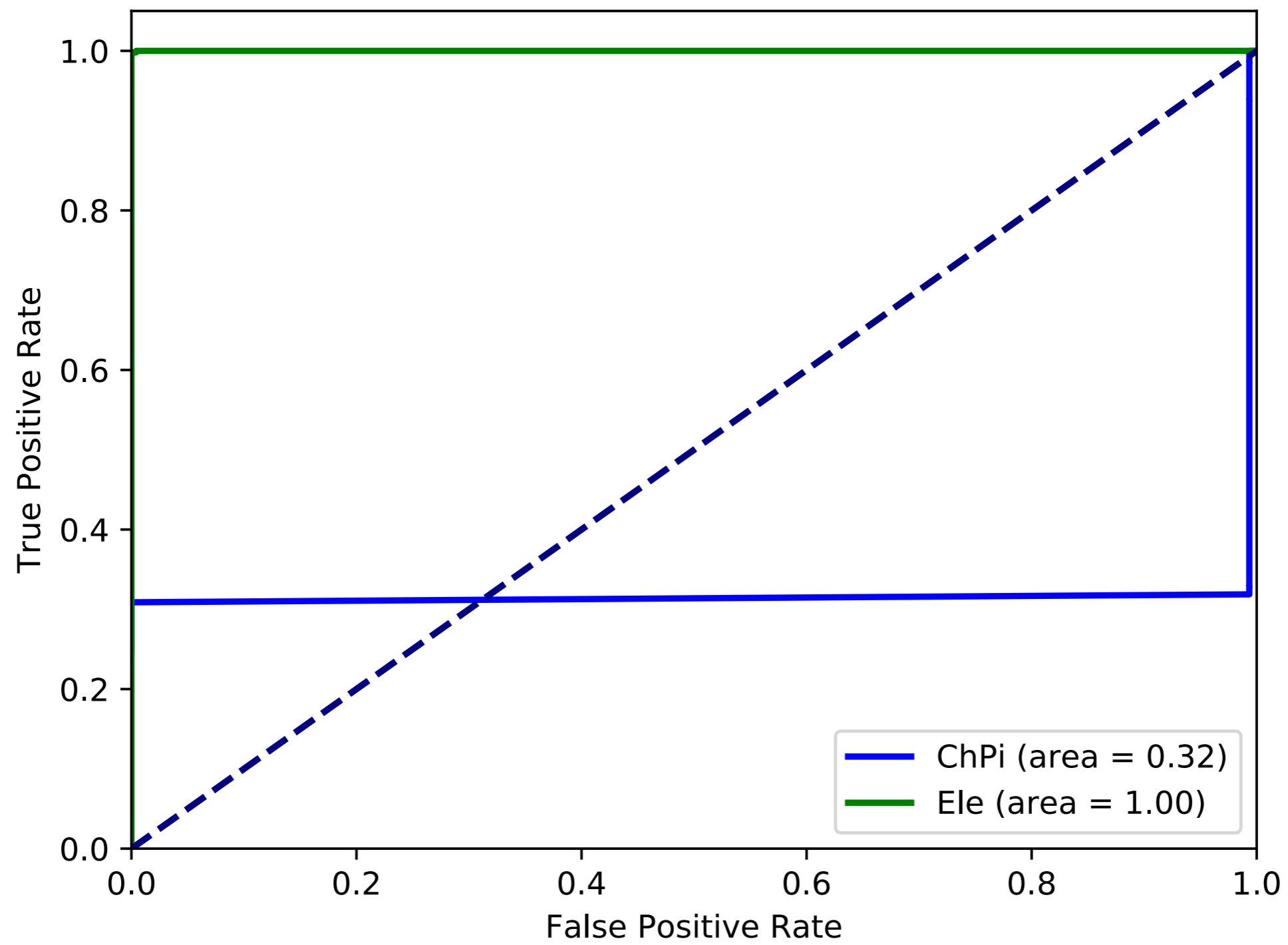




Neural network (Width=32, Depth=2)







```
(Pdb) print TestSampleList
```

```
[('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_9.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_8.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_7.h5', ['ECAL', 'HCAL'], 'Elc'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_6.h5', ['ECAL', 'HCAL'], 'Elc')]
```

```
(Pdb) print TrainSampleList
```

```
[('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_1.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_0.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_2.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_3.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_7.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_6.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_4.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ChPiEscan/ChPiEscan_5.h5', ['ECAL', 'HCAL'], 'ChPi'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_9.h5', ['ECAL', 'HCAL'], 'Elc'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_8.h5', ['ECAL', 'HCAL'], 'Elc'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_2.h5', ['ECAL', 'HCAL'], 'Elc'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_3.h5', ['ECAL', 'HCAL'], 'Elc'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_1.h5', ['ECAL', 'HCAL'], 'Elc'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_0.h5', ['ECAL', 'HCAL'], 'Elc'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_4.h5', ['ECAL', 'HCAL'], 'Elc'),  
('/data/LCD/V2/ElcChPi/ElcEscan/ElcEscan_5.h5', ['ECAL', 'HCAL'], 'Elc')]
```