



CEPC

Jets, samples and Wednesday working meeting

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- https://code.ihep.ac.cn/cepc/CEPCSW/-/merge_requests/248
- Reduce rec memory.
- Decouple the geometry service.
- Need to re-organize the script order.
- (Not merged yet.) Under discussion.

Store EcalBar geometry meta data into root file.

1. root file size +~ 10KB
2. simulation mem usage: 3.10GB -> 3.80 GB
3. CyberPFA mem usage: -> 1.6GB

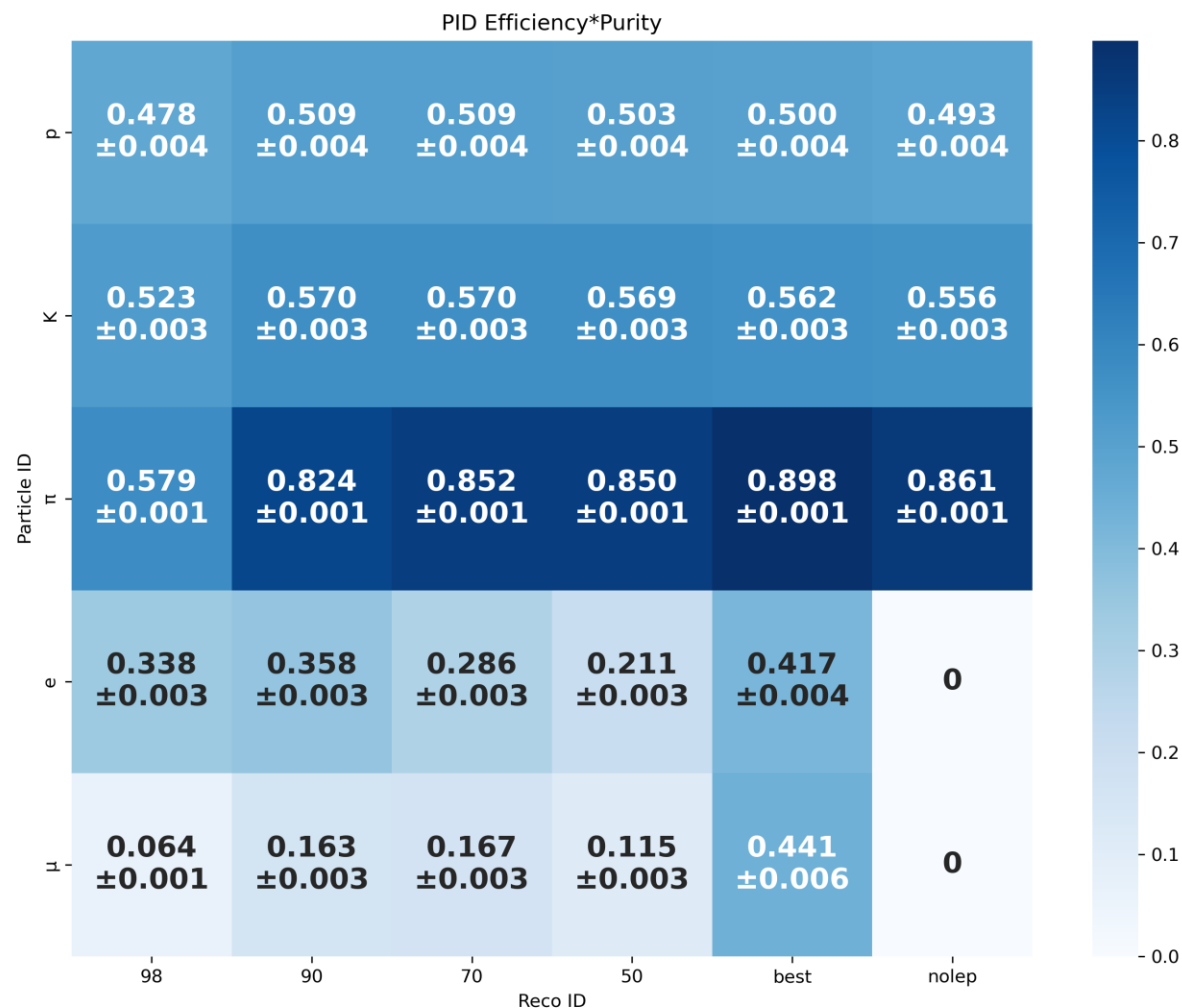
Using Geliang's XGBoost PID on Hbb jet:

`/hpcfs/cepc/higgsgpu/zhangk1/datasets0506/33*bb.root`

20000 jets

-> Dominant in Hqq environment

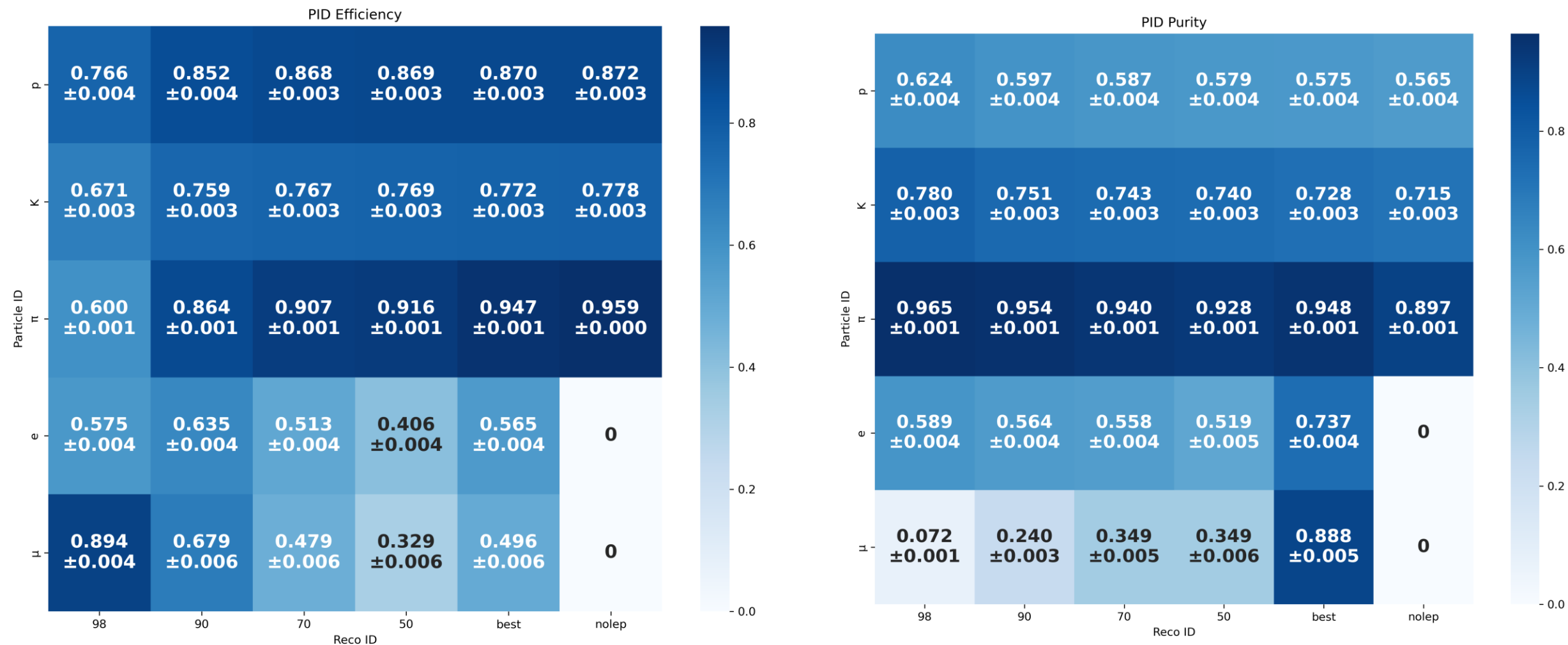
Eff*Purity with uncertainty



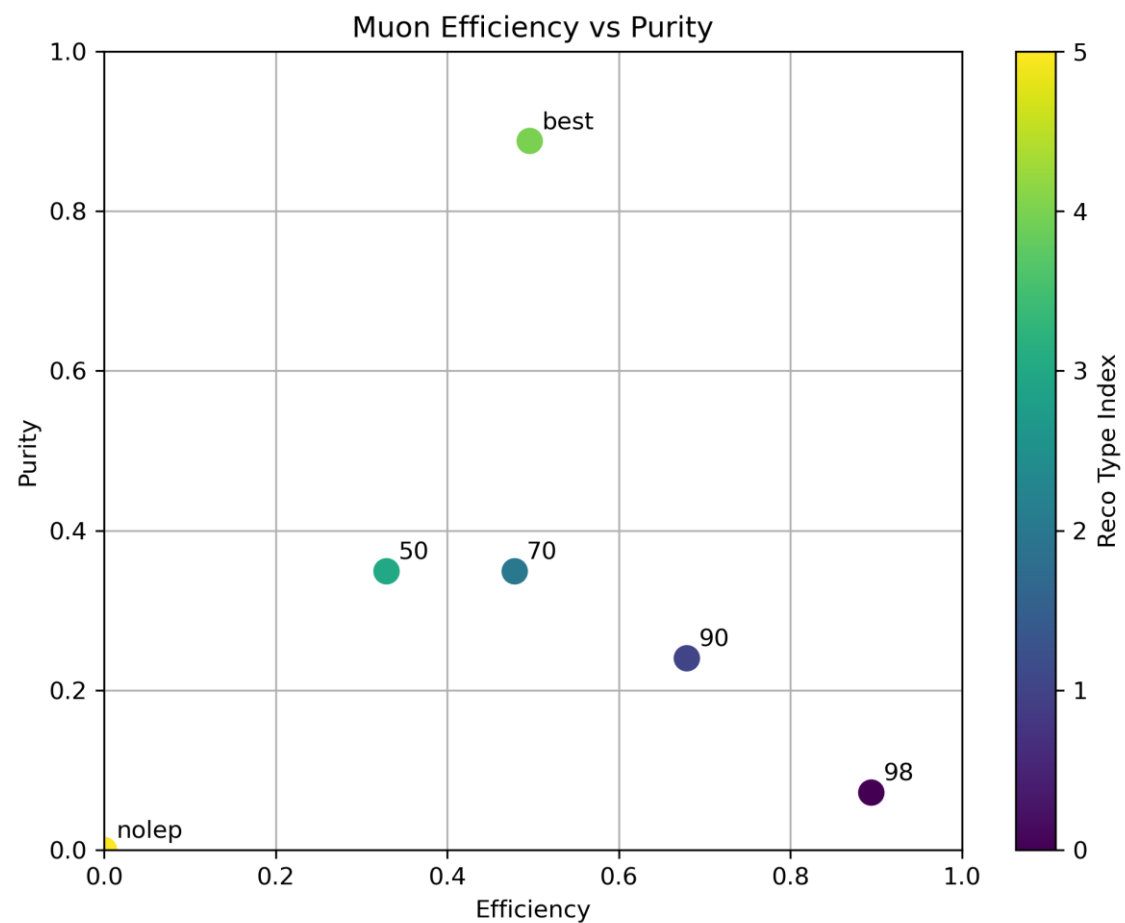
Last week, the large uncertainty due to the entries scaled to event level. ($O(1)$). Now fixed. $\sim O(20000)$

High eff*purity found in “best” WP, which requires the maximum likelihood among 5 categories.

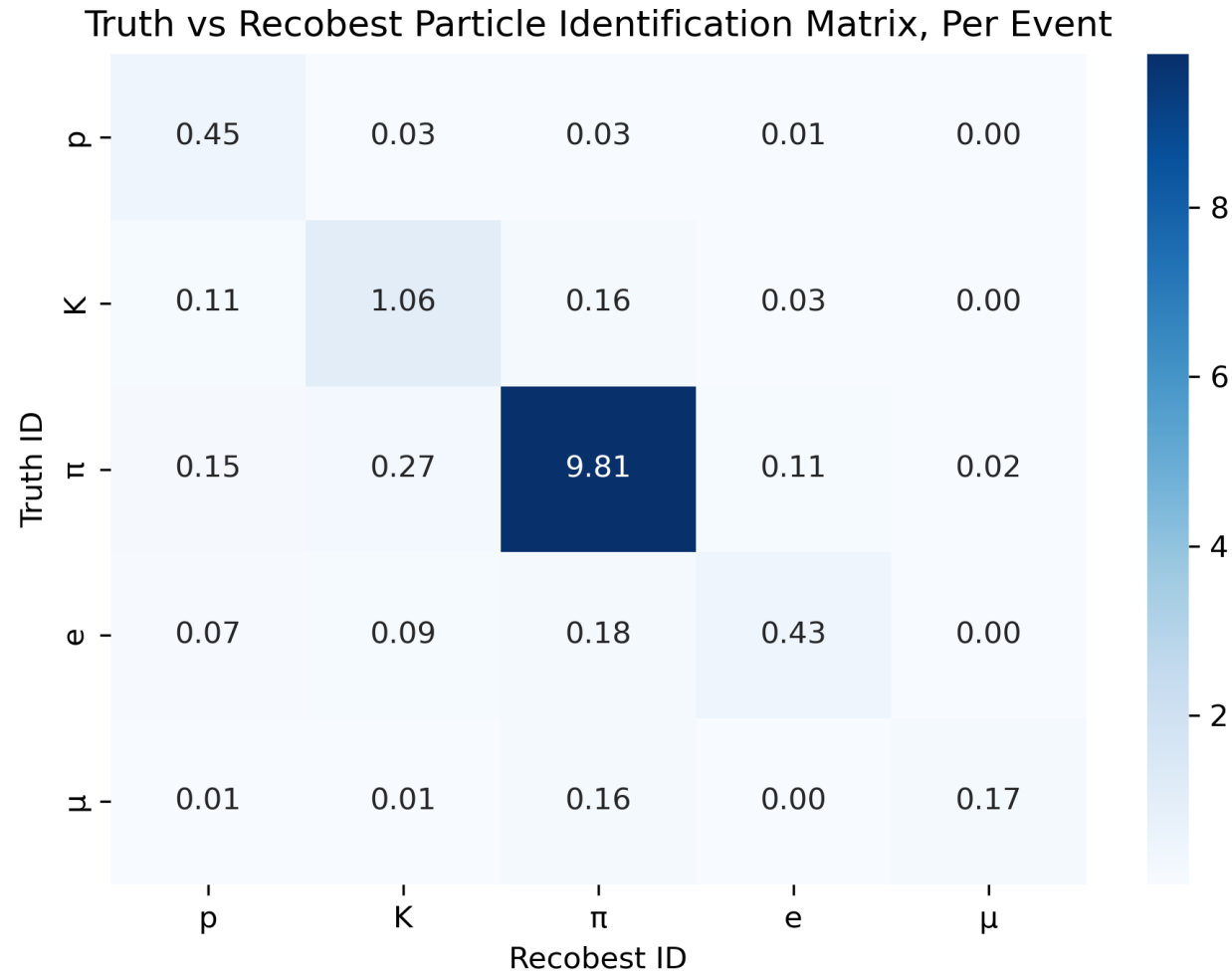
In this way, ~50Eff% and high Purity for e and muon. Even for those low energy leptons which lacks information.



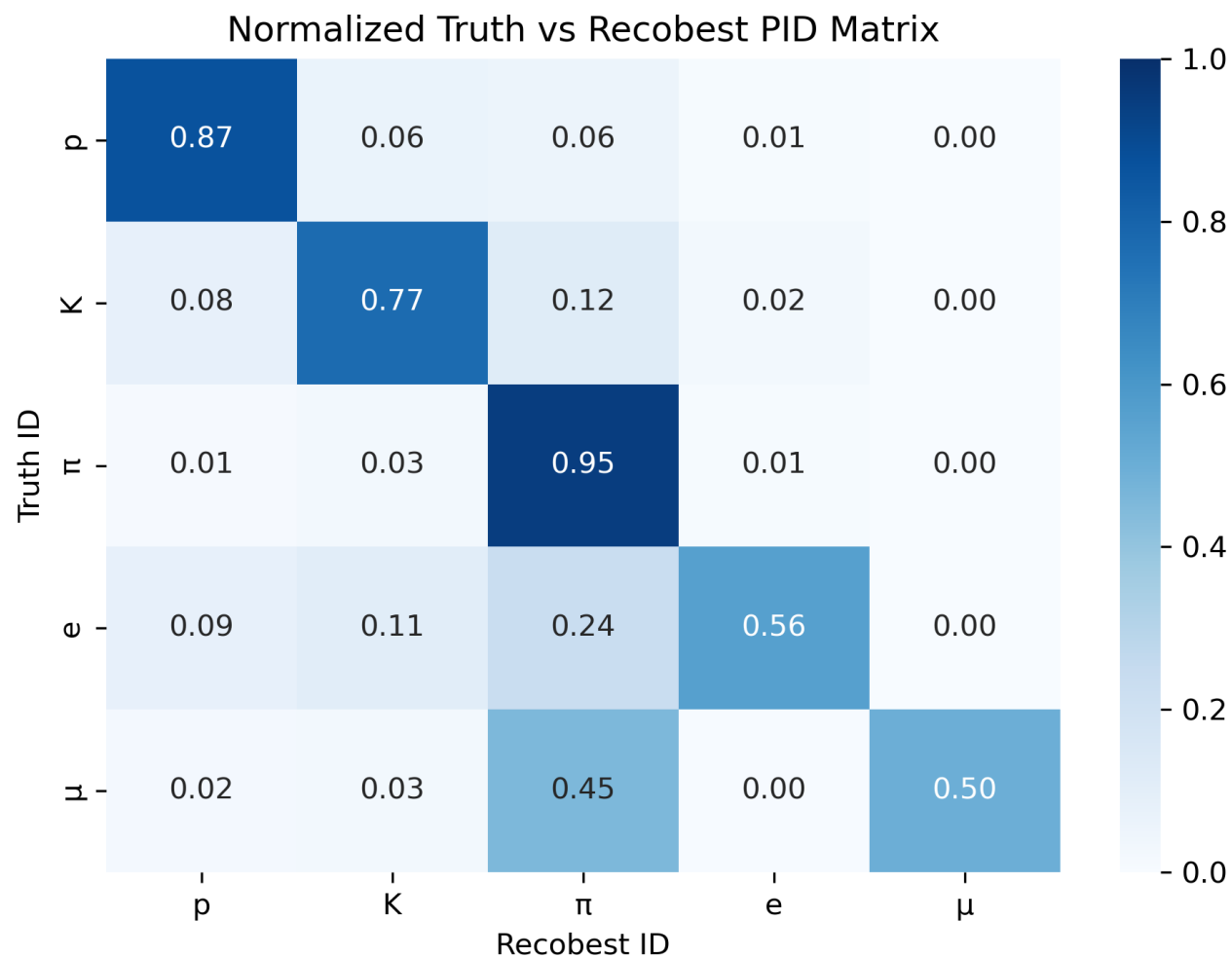
Maximum likelihood: best WP.



Confusion matrix, scale by one event.



Confusion matrix, scale by category



Clear separation between p/k/pi to e/mu.

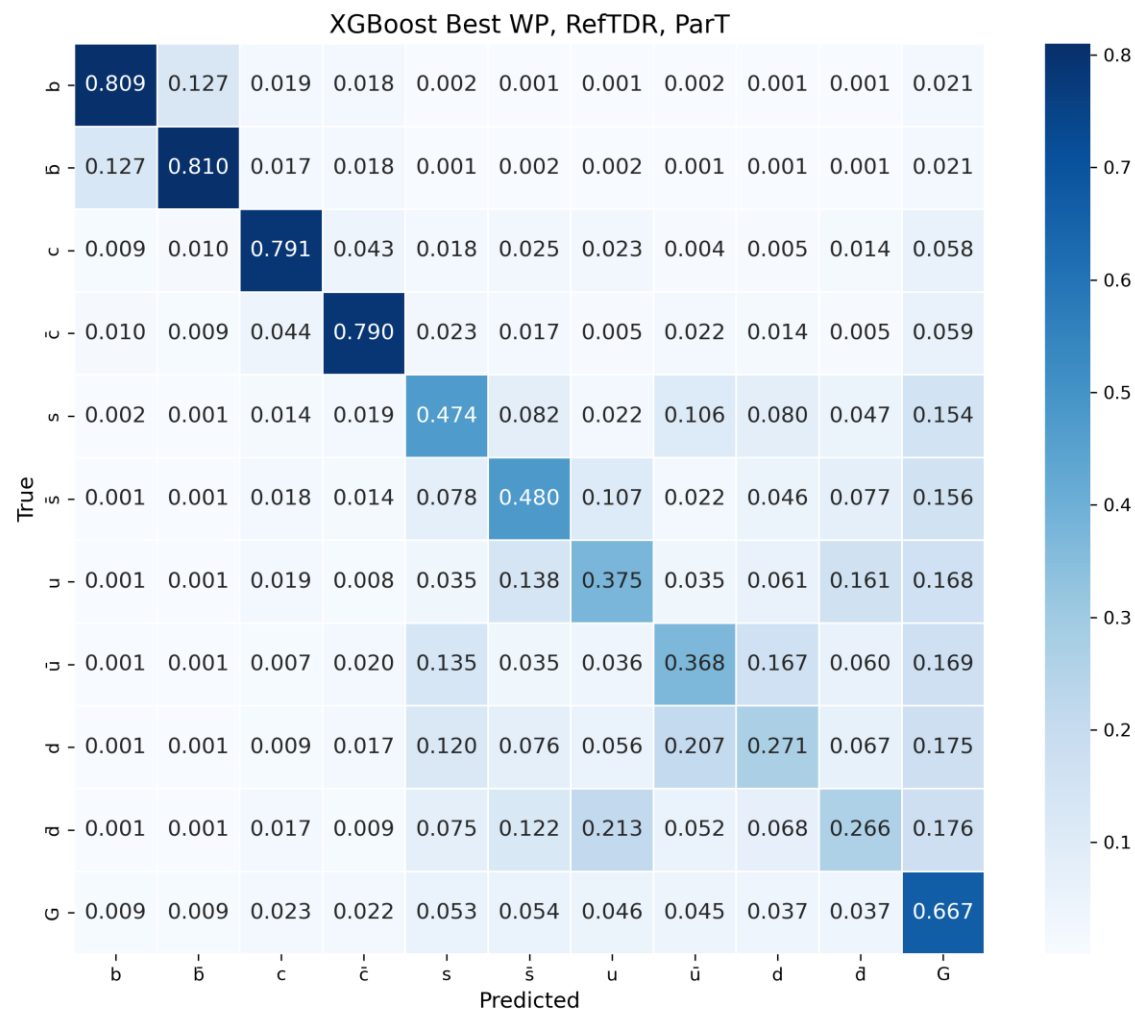
Clear separation between e/muon

Very low contamination ratio for pion->muon, even for low energy.

Muon eff ~50% and ~50% failed to Pion.

JOI Application

Use 1M sample training. Not application.



XGBest: 0.5545.

Slightly better
than Reco70.

Past:

Truth: 0.5936

Reco70: 0.5510

Nolep: 0.5494

Reco98: 0.5153

NoID: 0.4825

XG_Best gets lower s eff but higher gluon eff compared to Reco70.
However, the PID improvement leads to small impact on JOI.

		ParT_TruthID										
Truth	b	0.832	0.113	0.019	0.016	0.002	0.001	0.001	0.002	0.001	0.001	0.012
	bbar	0.113	0.831	0.016	0.018	0.001	0.002	0.002	0.001	0.001	0.002	0.012
	c	0.009	0.009	0.822	0.034	0.024	0.024	0.023	0.005	0.006	0.014	0.030
	cbar	0.009	0.009	0.035	0.820	0.024	0.024	0.005	0.023	0.016	0.006	0.030
	s	0.002	0.001	0.015	0.017	0.584	0.081	0.023	0.085	0.081	0.042	0.069
	sbar	0.001	0.001	0.015	0.016	0.079	0.586	0.087	0.023	0.046	0.076	0.070
	u	0.001	0.002	0.018	0.006	0.029	0.114	0.440	0.044	0.079	0.183	0.085
	ubar	0.002	0.001	0.007	0.018	0.115	0.031	0.048	0.422	0.202	0.071	0.084
	d	0.001	0.001	0.009	0.016	0.096	0.074	0.072	0.212	0.362	0.071	0.086
	dbar	0.001	0.001	0.016	0.009	0.074	0.099	0.233	0.067	0.079	0.334	0.087
	g	0.012	0.012	0.028	0.027	0.075	0.075	0.076	0.071	0.067	0.060	0.498
		b	bbar	c	cbar	s	sbar	u	ubar	d	dbar	g
		Predicted										

		ParT_RecoID70										
Truth	b	0.806	0.133	0.020	0.019	0.002	0.001	0.001	0.002	0.001	0.001	0.013
	bbar	0.133	0.805	0.020	0.020	0.002	0.002	0.002	0.001	0.001	0.001	0.013
	c	0.009	0.012	0.792	0.047	0.021	0.028	0.026	0.006	0.007	0.016	0.036
	cbar	0.012	0.009	0.048	0.789	0.029	0.021	0.006	0.025	0.017	0.007	0.037
	s	0.002	0.001	0.016	0.021	0.503	0.094	0.025	0.115	0.085	0.052	0.087
	sbar	0.001	0.002	0.020	0.016	0.089	0.504	0.120	0.025	0.052	0.084	0.087
	u	0.001	0.002	0.022	0.009	0.040	0.153	0.396	0.039	0.068	0.175	0.094
	ubar	0.002	0.001	0.009	0.023	0.153	0.040	0.042	0.390	0.178	0.067	0.095
	d	0.002	0.001	0.011	0.022	0.130	0.087	0.065	0.229	0.283	0.076	0.096
	dbar	0.001	0.002	0.021	0.011	0.087	0.134	0.235	0.058	0.078	0.275	0.097
	g	0.012	0.012	0.031	0.030	0.077	0.079	0.069	0.067	0.055	0.052	0.517
		b	bbar	c	cbar	s	sbar	u	ubar	d	dbar	g
		Predicted										

To dos



- Further study the JOI Impact parameters. (VTX, PID)
- Test applications on Zqq, E360, cases like 4j.
- Write universal package to use. (Under construction)