Jet@Clusters

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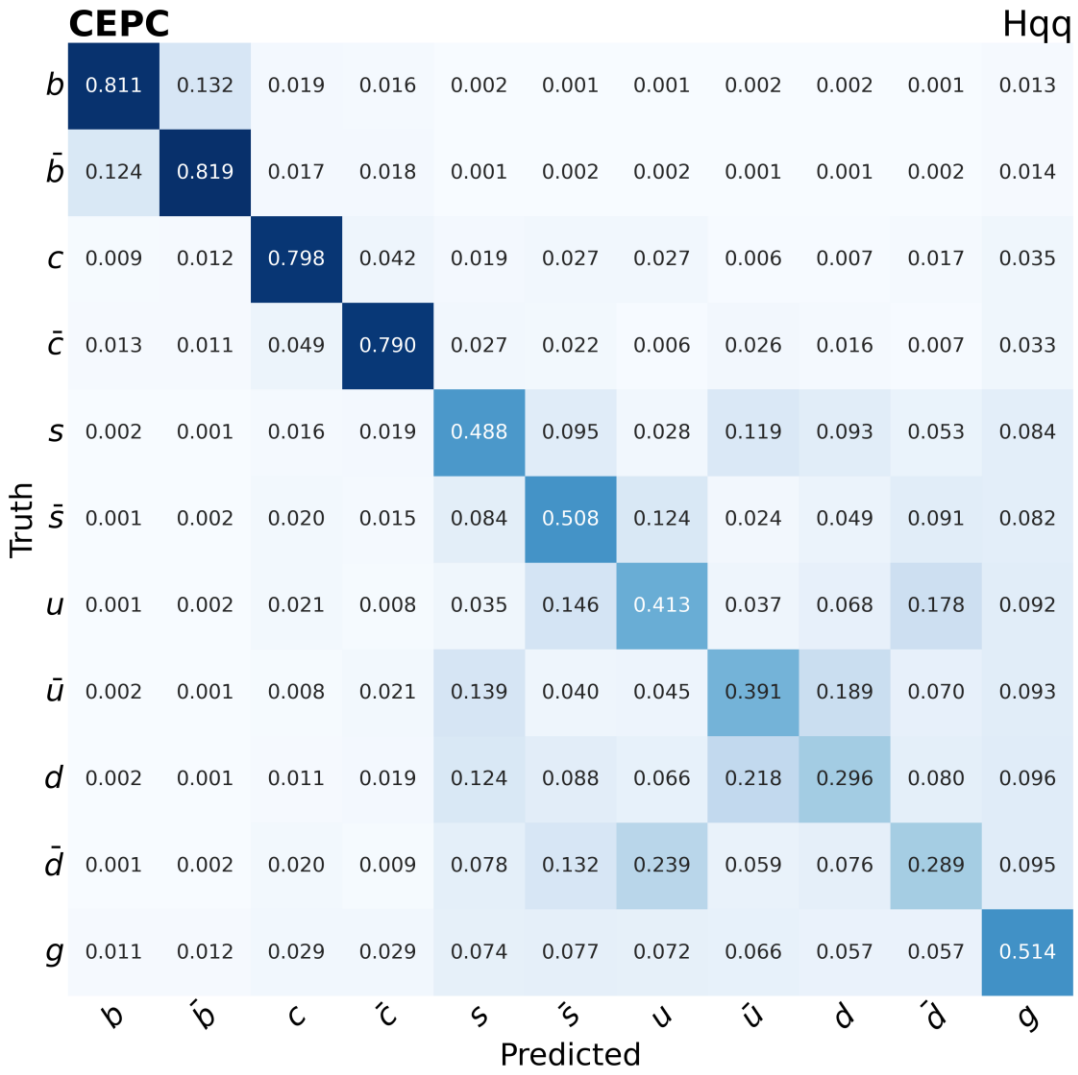
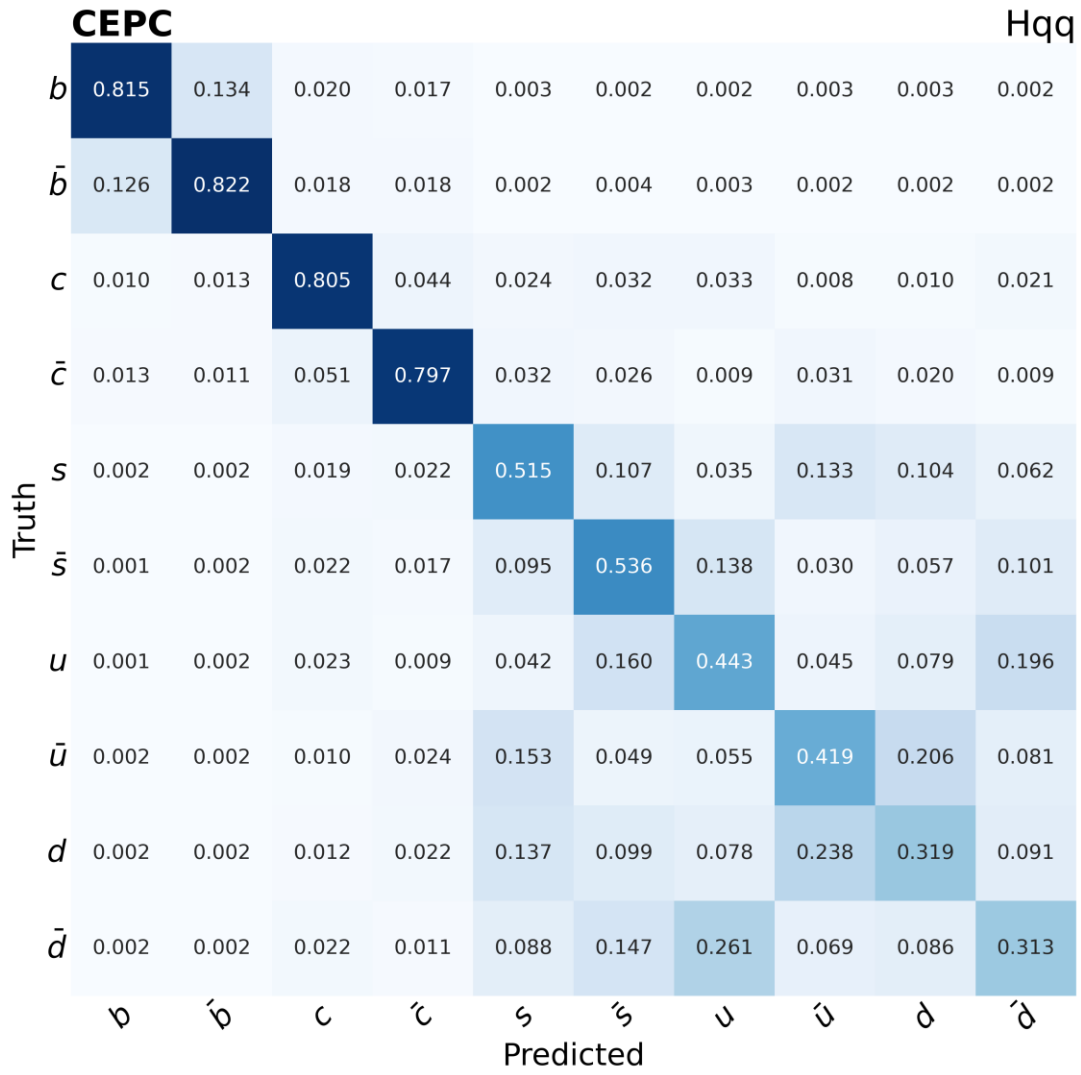
Hqq M11->M10

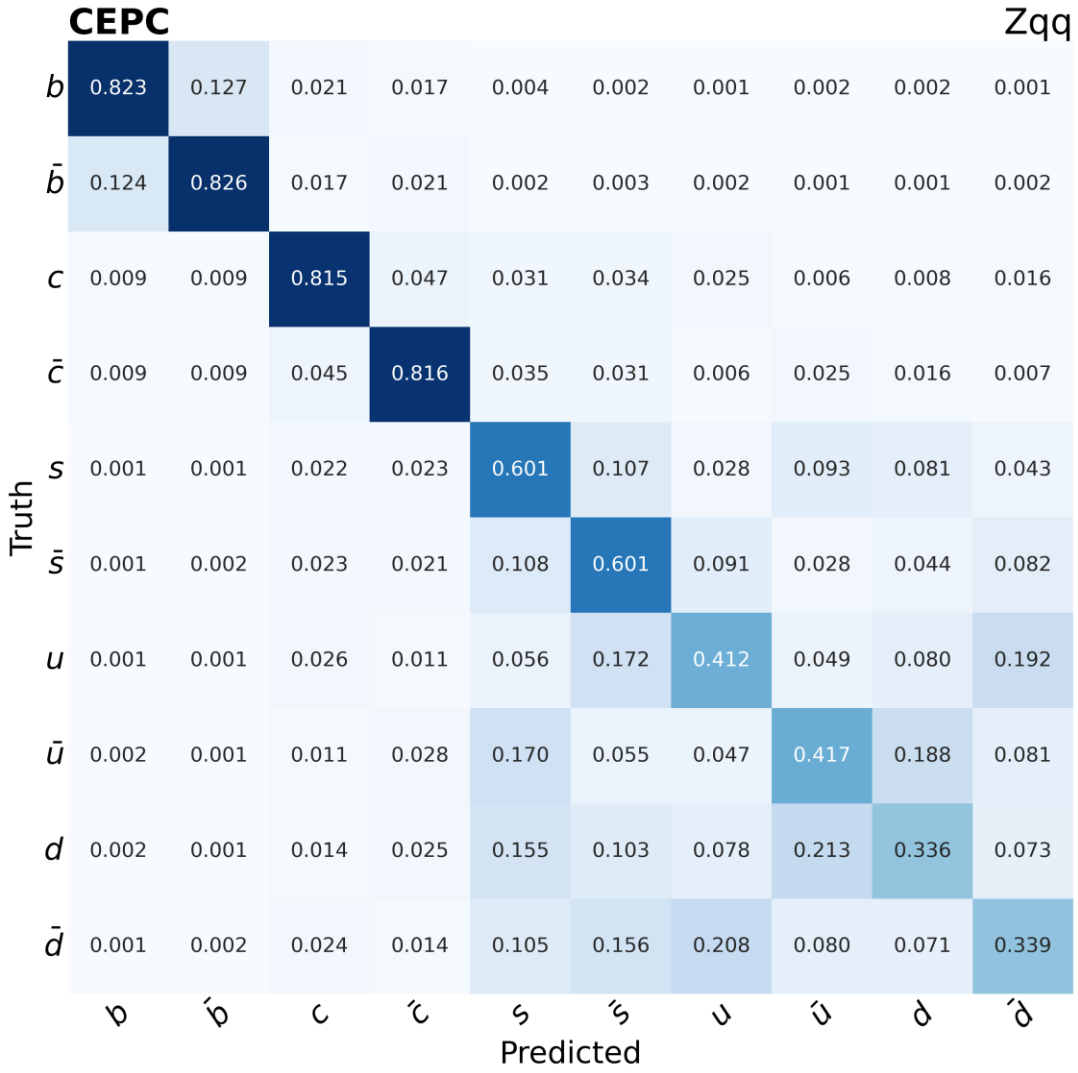
Exclude gluon, re-normalization:

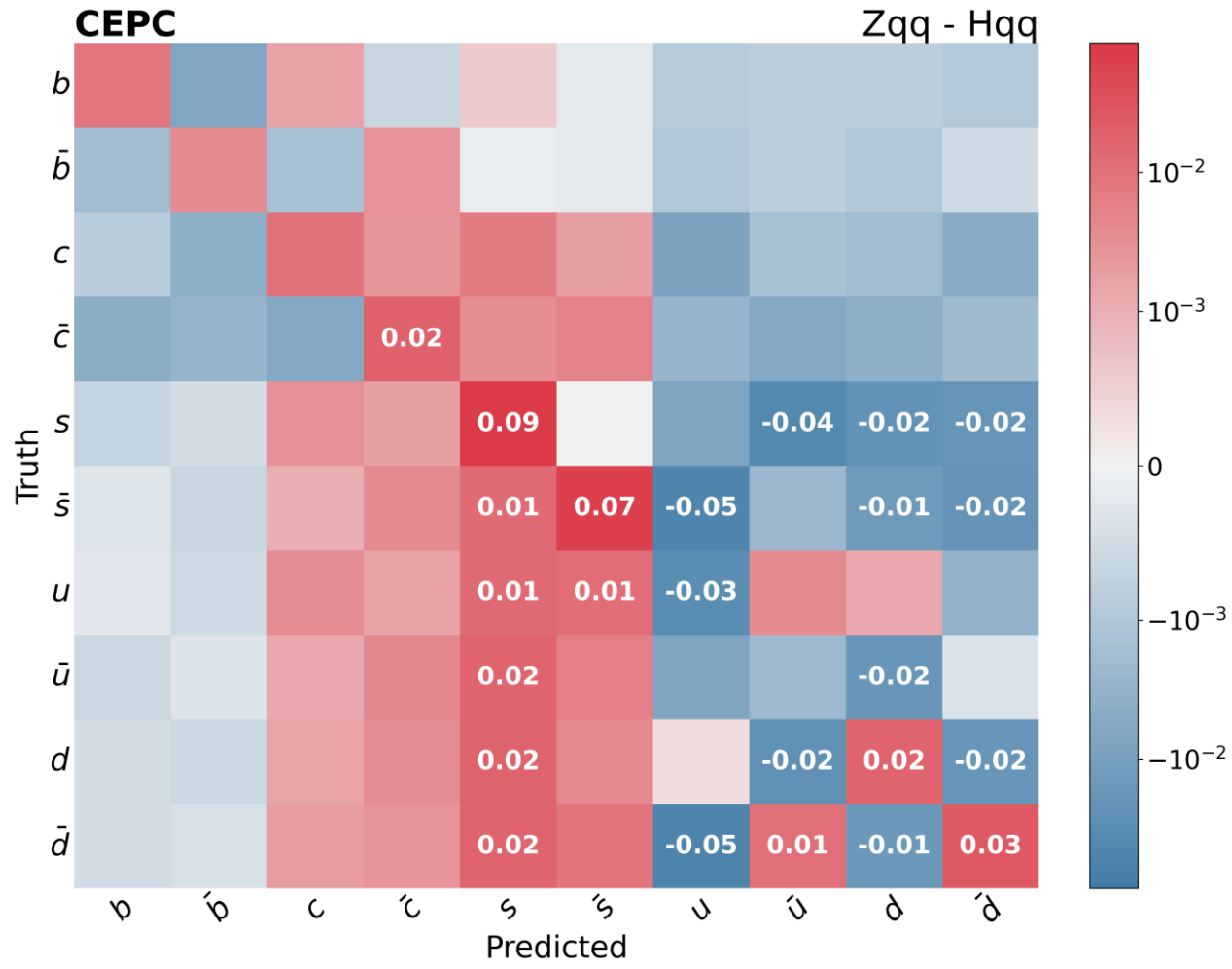




Zqq M10

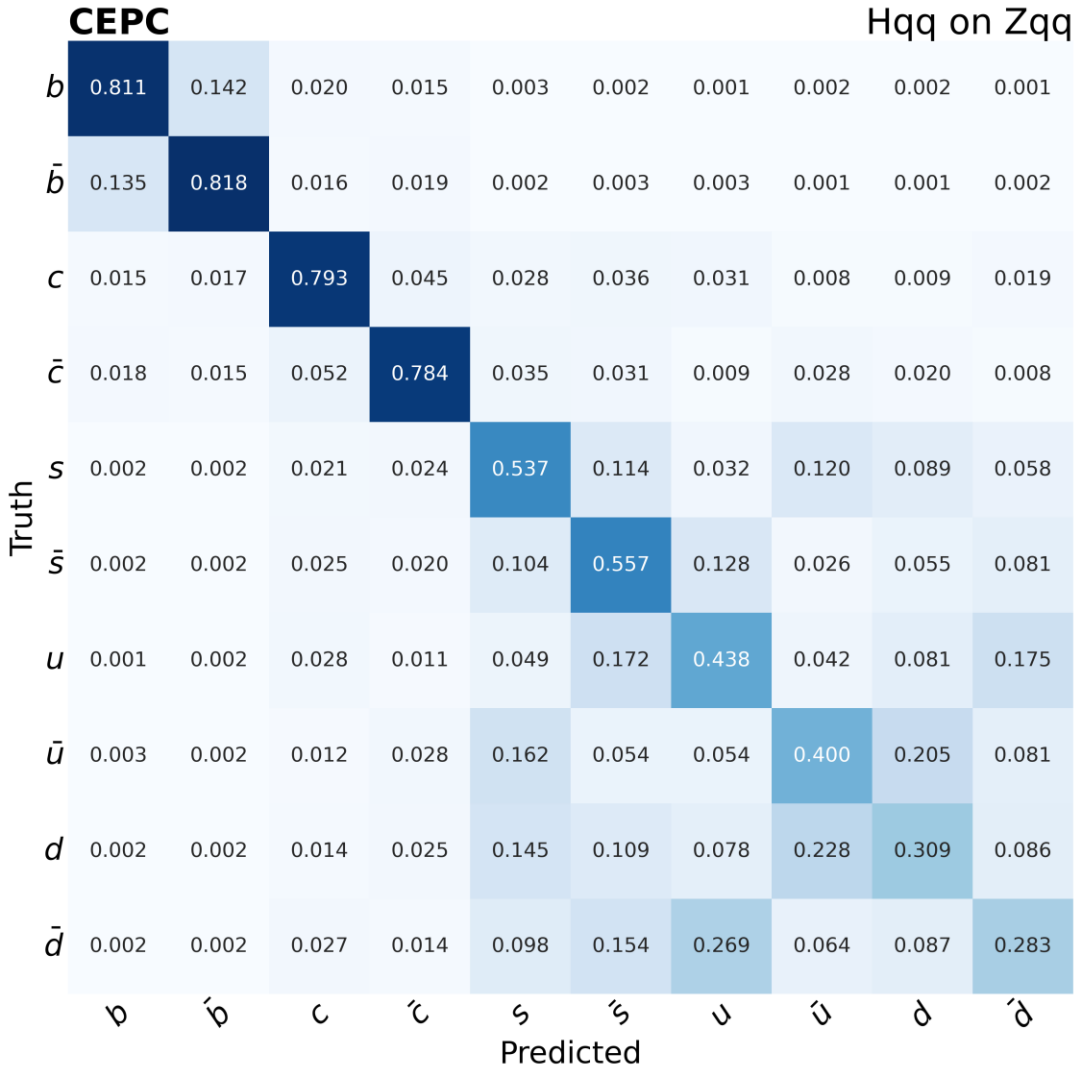
Hqq M10: 0.5784
Zqq M10: 0.5986
Difference: 3.5%
Major difference: better S, since no gluon contamination?

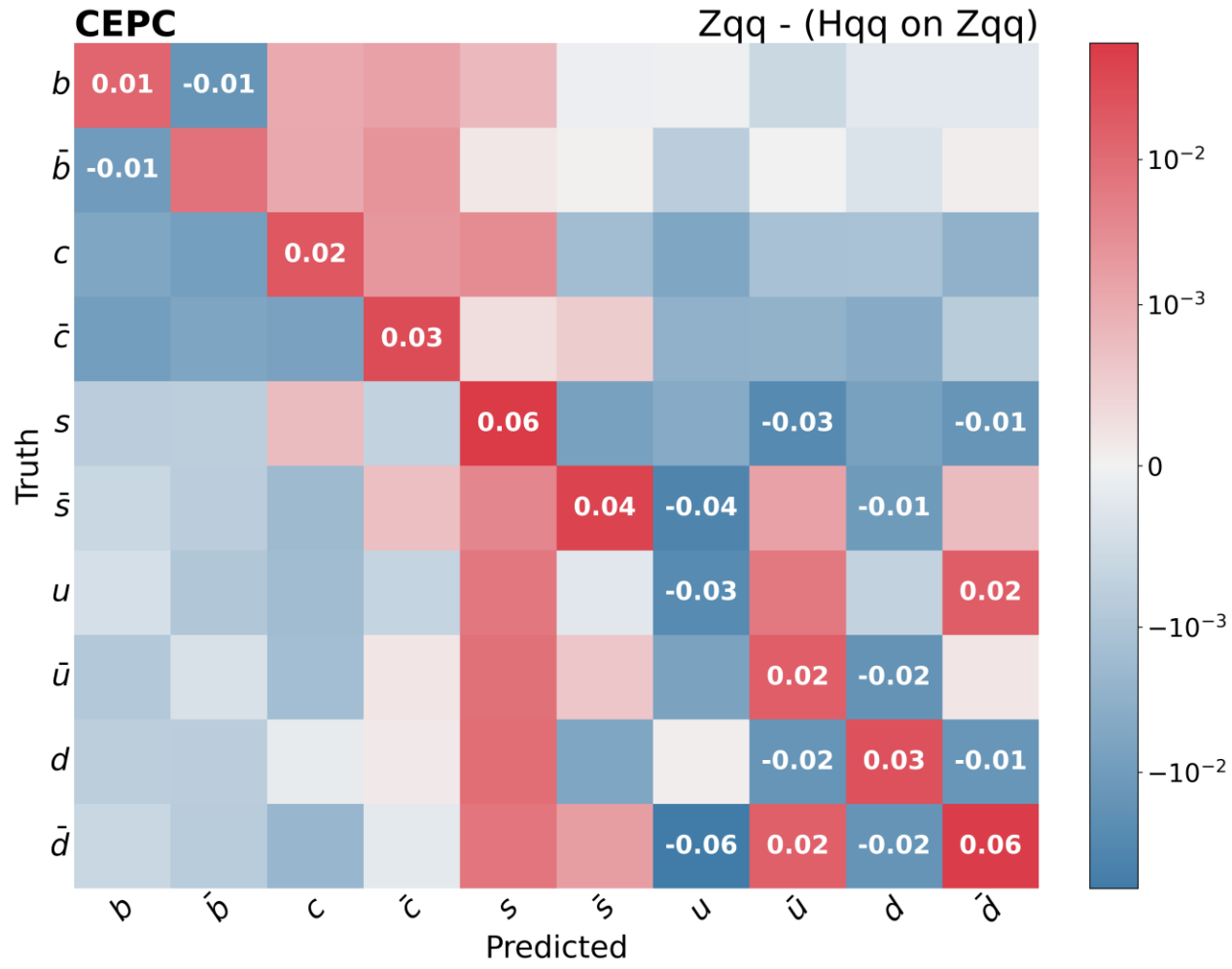




Hqq applied to Zqq

Hqq on Zqq M10: 0.5730
Reduce from Hqq: 0.94%
Reduce from Zqq: 4.4%

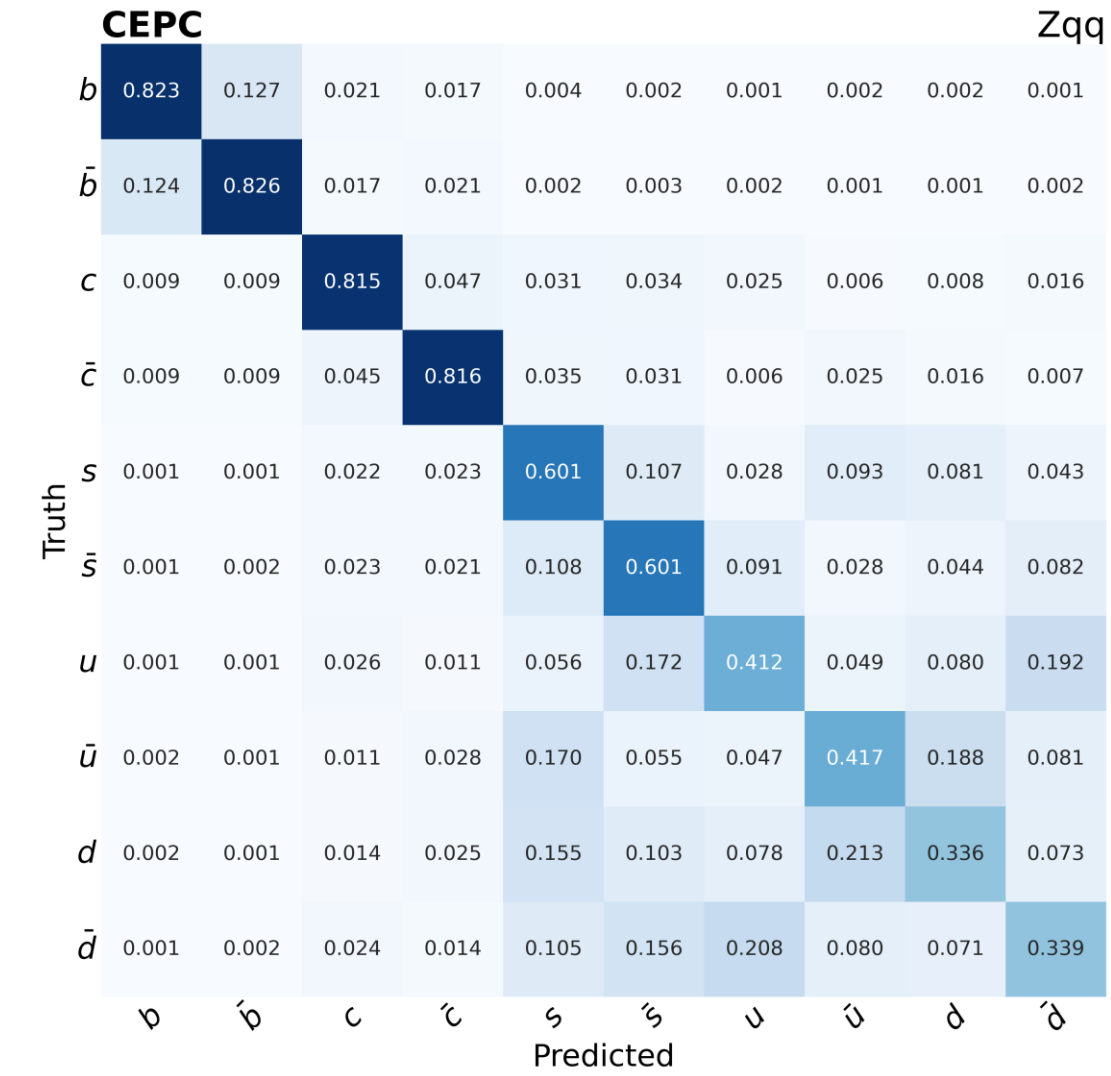


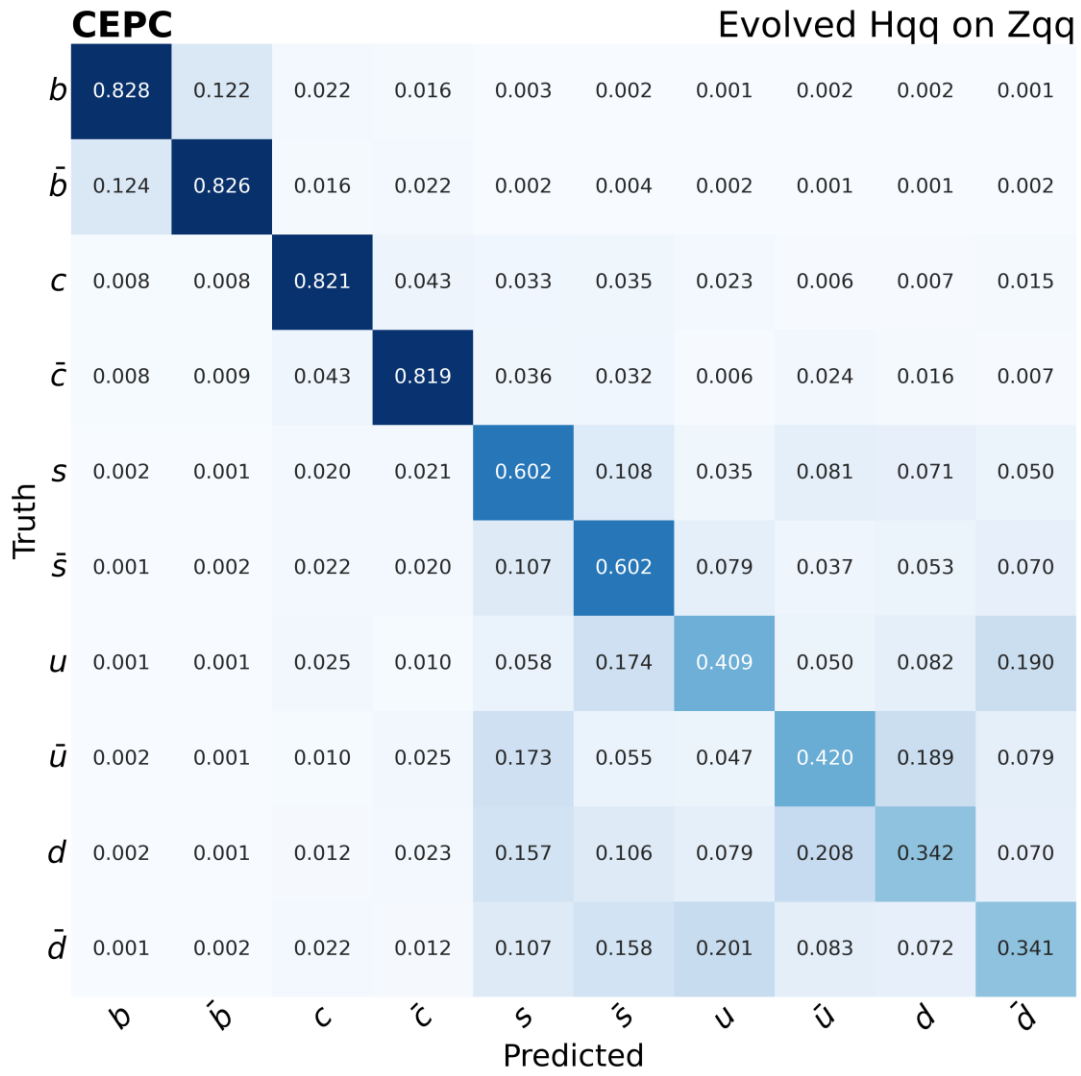


Continued Transfer learning

Continue training on Zqq sample for 3 epochs:
0.6010, with start_lr=1e-4. 0.4% better than Zqq.

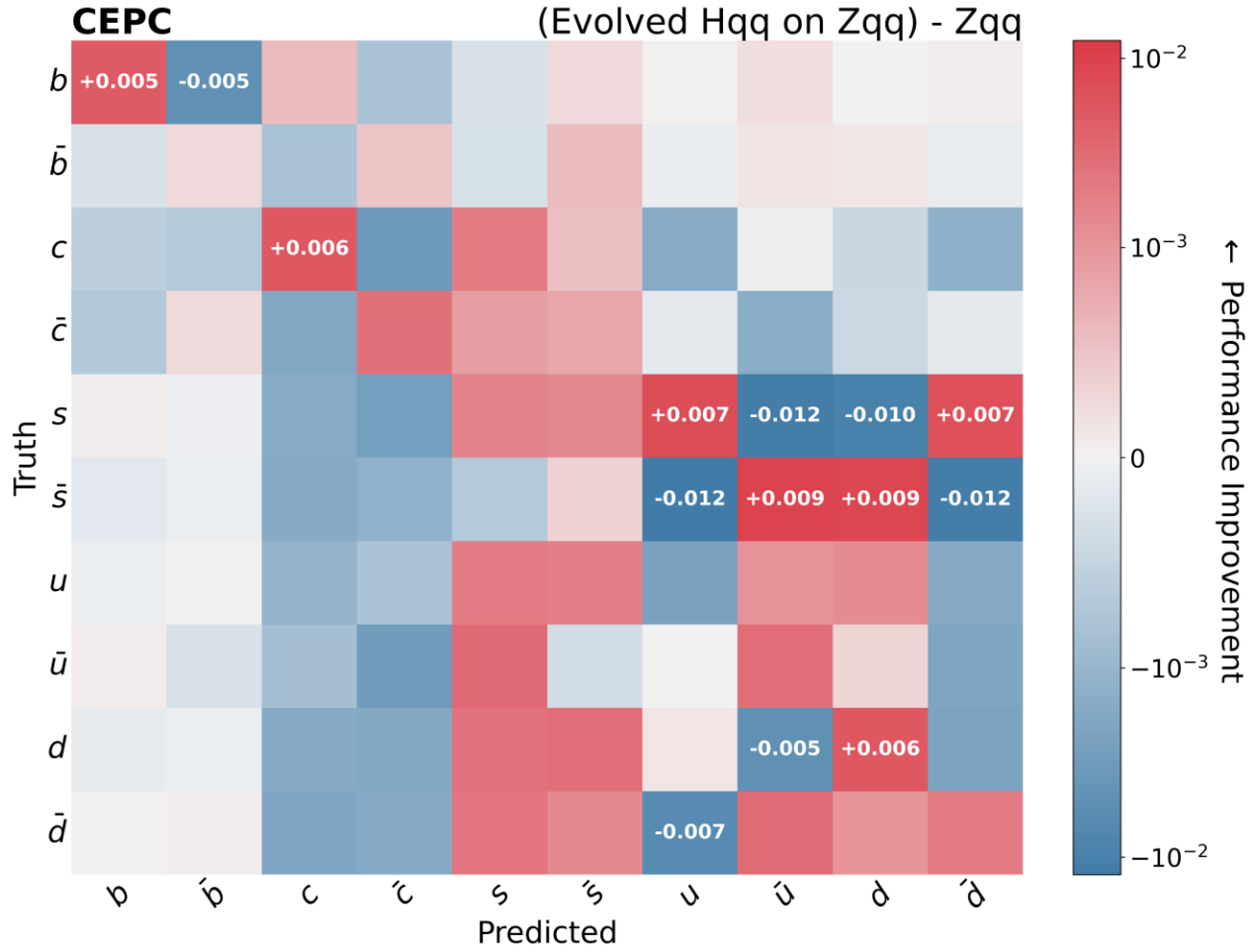
```
[2025-08-24 06:07:27,733] INFO: Epoch #0: Current validation metric: 0.59294 (best: 0.59294)
[2025-08-24 07:06:06,571] INFO: Epoch #1: Current validation metric: 0.59724 (best: 0.59724)
[2025-08-24 08:05:00,657] INFO: Epoch #2: Current validation metric: 0.60101 (best: 0.60101)
```





Transfer learning:

- Hqq applied to Zqq: 0.94% drop
  - Reasonable generalization, minor drop
- Zqq 4.4% better than Generalized Hqq
  - Significant gap to the native model.
- Fine-tuning with Zqq sample:
  - Gap bridged, and 0.4% more.

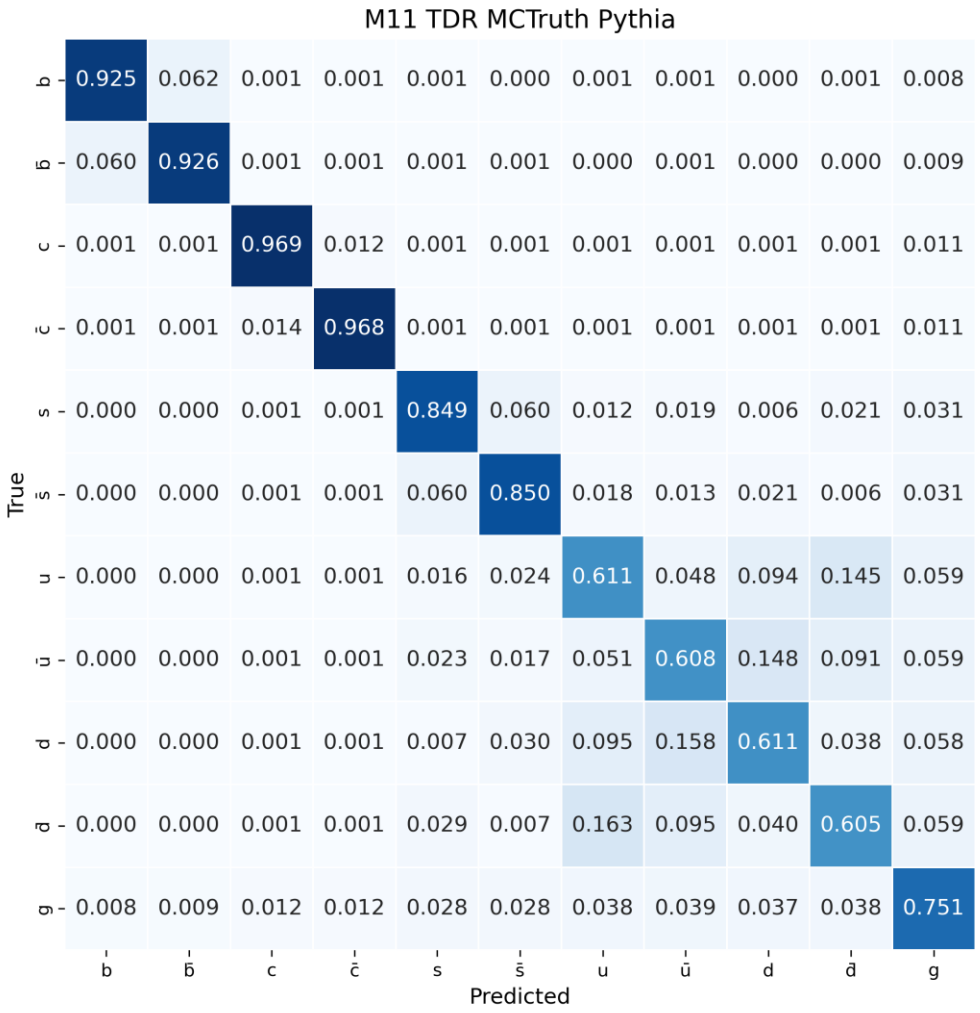


In TDR

Can add another plot to demonstrate if needed.

370 This JOI model, optimized within a Higgs-boson production environment, demon-
371 strates its capability for knowledge transfer across diverse kinematic energy scales. across
372 diverse kinematic energy scales. A brief fine-tuning process on $Z \rightarrow q\bar{q}$ final states
373 proves adequate to surpass the performance of models explicitly tailored for that data.
374 This validates the pre-trained model not just as a foundation, but as a superior starting
375 point for related tasks, showcasing its energy-independent robustness and the power of the
376 transfer learning approach.

0.7884



Generator	PID	Simu	Metric
Whizard195+Py6	Truth	Truth	0.7438
Whizard195+Py6	Truth	Fast	0.6007
Whizard195+Py6	Truth	Full	0.5936
Whizard195+Py6	Reco	Full	0.5562

Generator	PID	Simu	Metric
Mg5+Pythia8	Truth	Truth	0.7884
Mg5+Pythia8	Truth	Fast	0.6226

Generator	PID	Simu	Metric
Mg5+Herwig	Truth	Truth	0.7454
Mg5+Herwig	Truth	Fast	0.6053