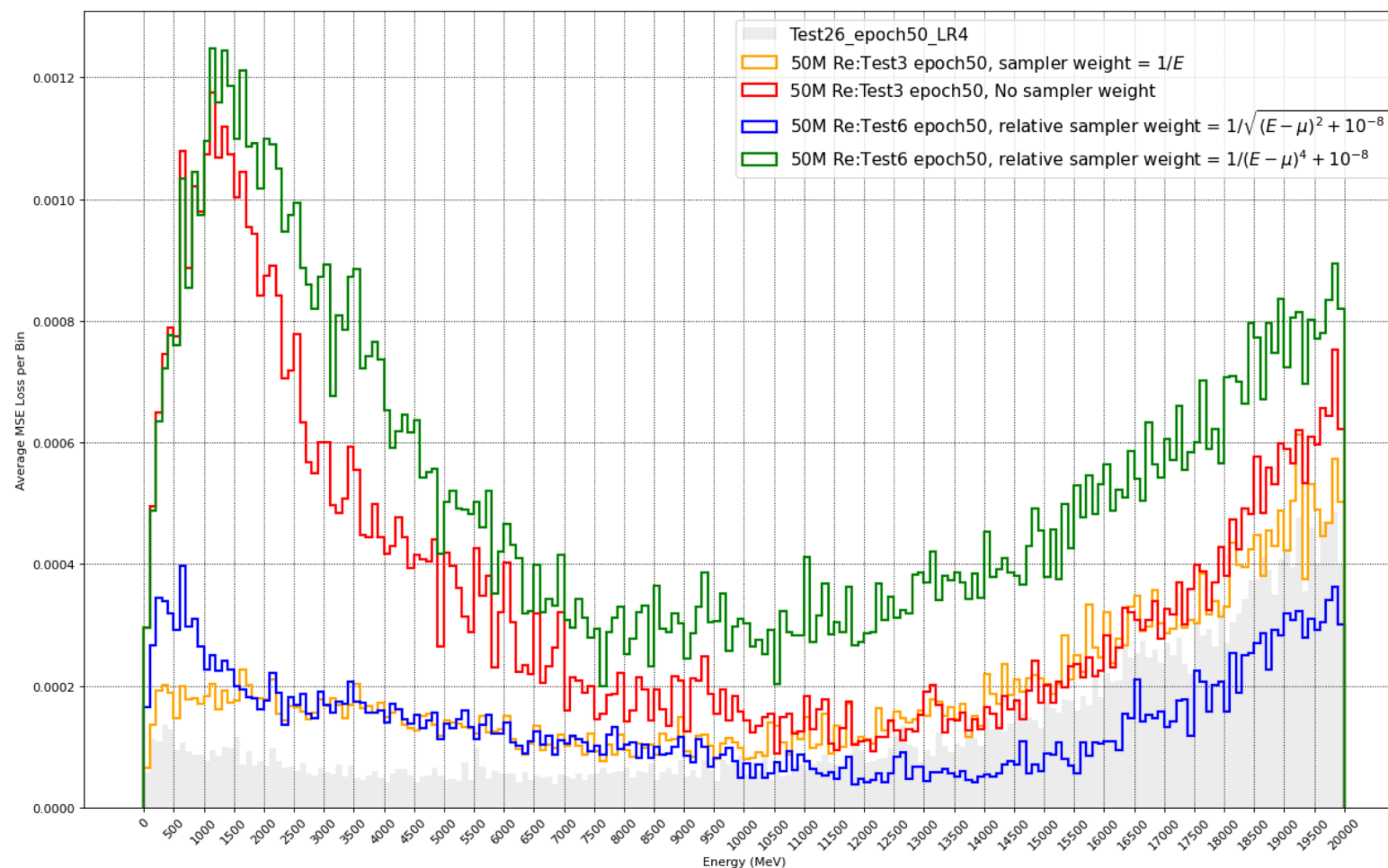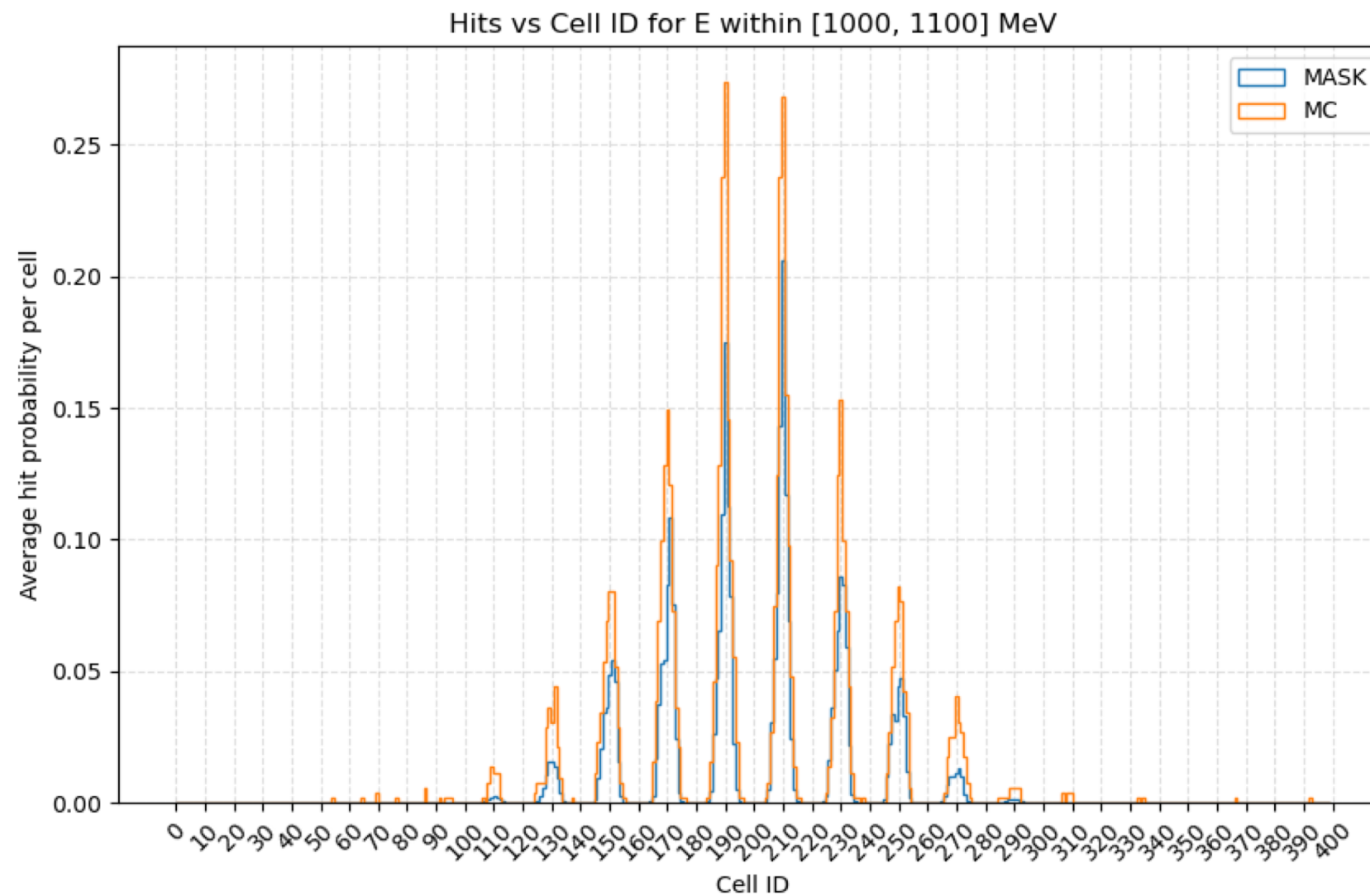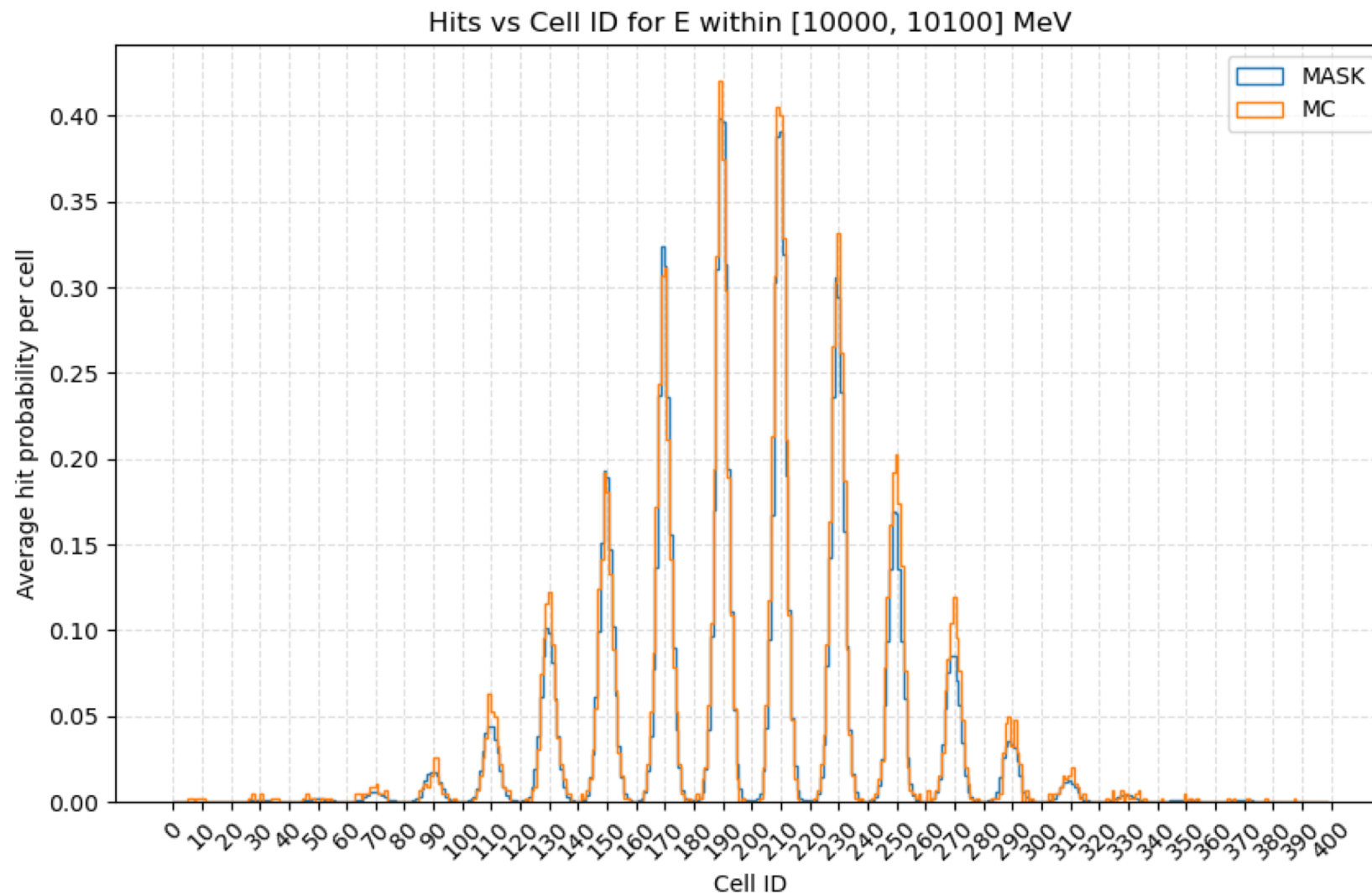# Status report

2025/08/14

ZDC Internal

WAI YUEN CHAN

# Remind

- Last time we tried to apply a sampler weight related to the energy range.

- Eventually the one with $\frac{1}{\sqrt{(E-\mu)^2}}$ , where $\mu$ = mean energy, give the best performance.
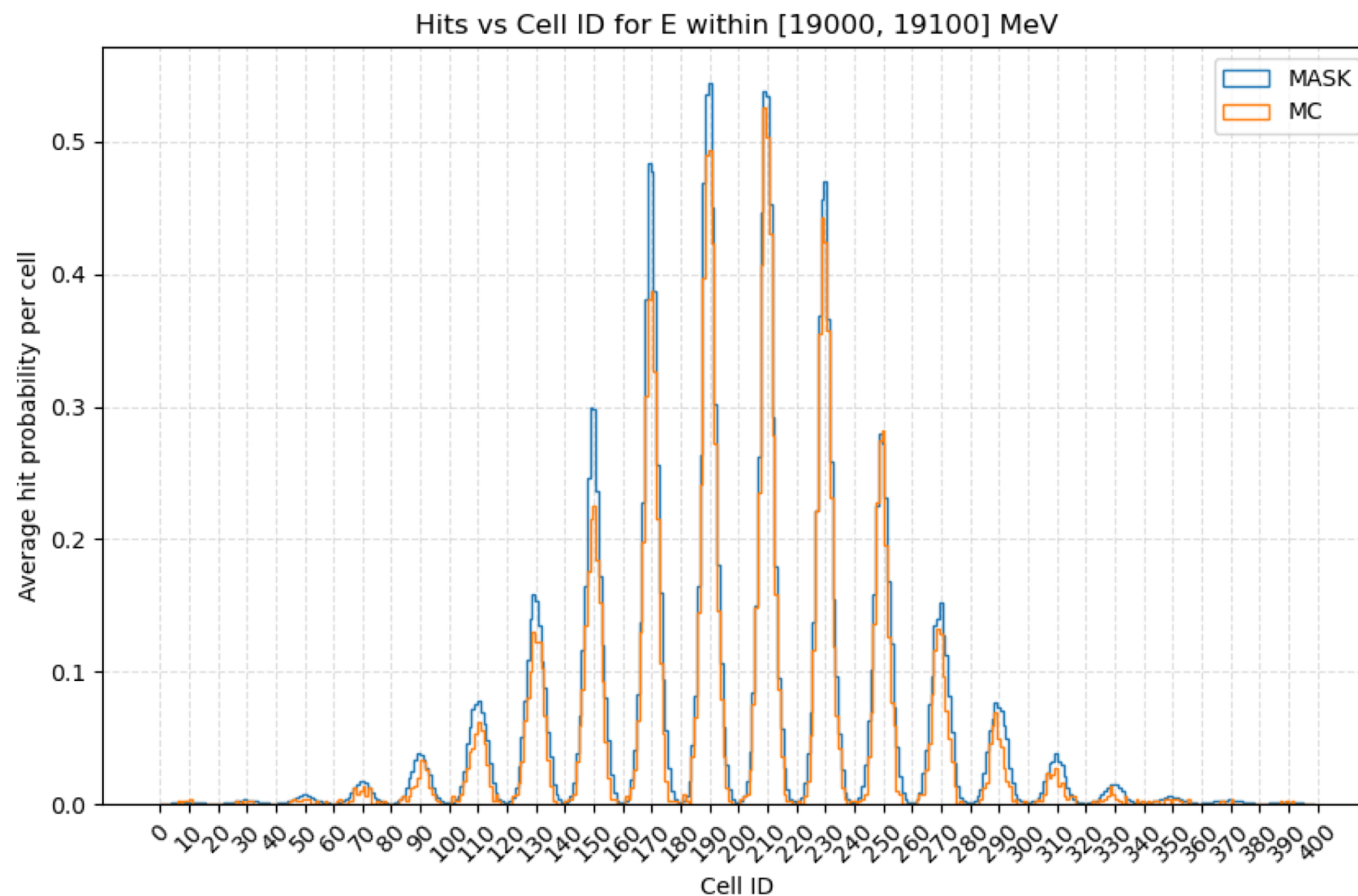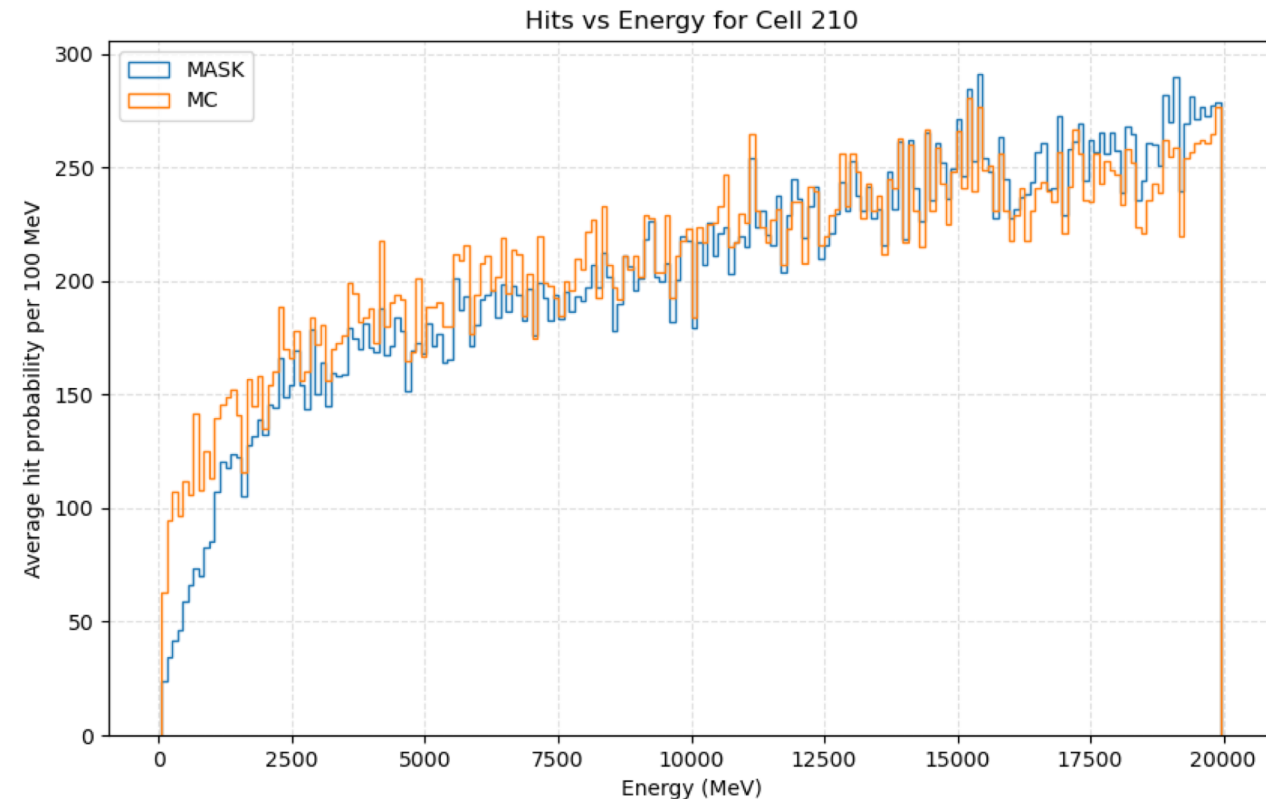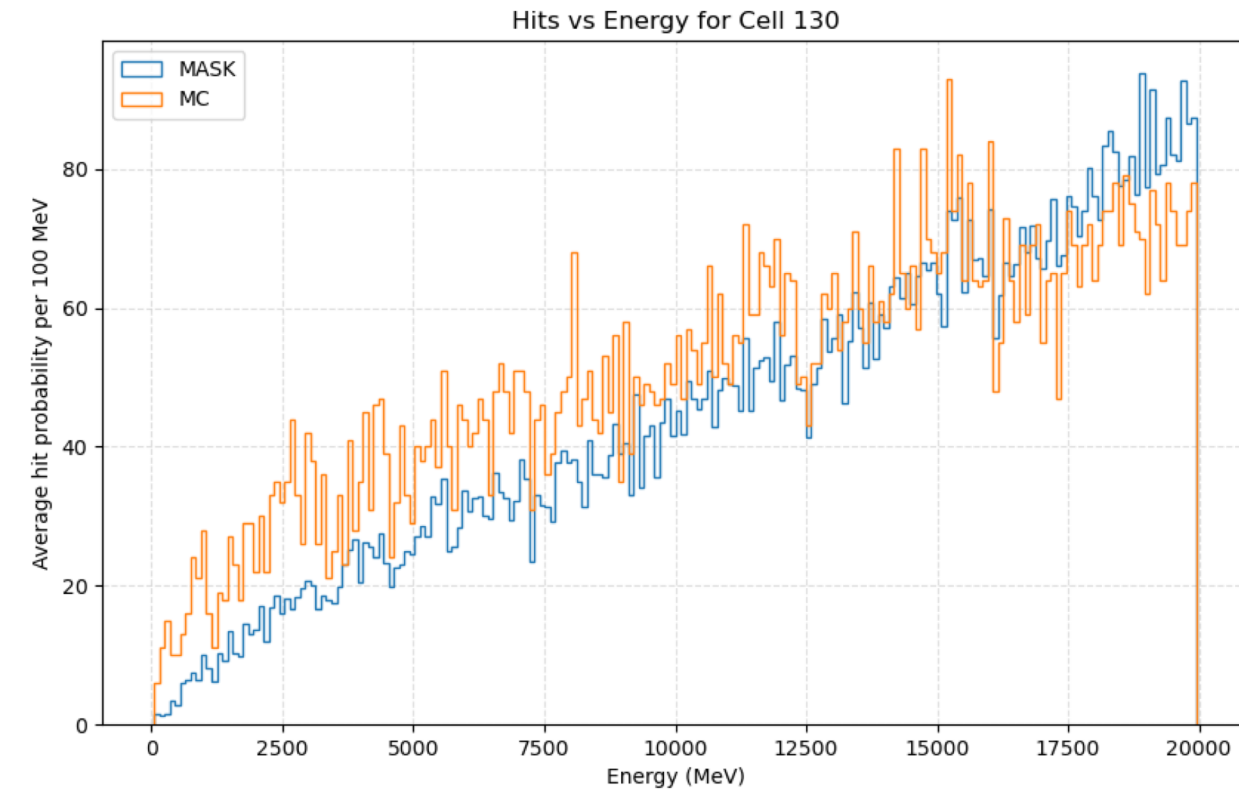


2025/8/28

Hits vs Cell ID for E within [1000, 1100] MeV

# Count vs energy per cell (Test6): mid E


Hits vs Cell ID for E within [10000, 10100] MeV

2025/8/28

Hits vs Cell ID for E within [19000, 19100] MeV

# Count vs energy per cell (Test6)



- Looks like the simulation at the center of the ZDC is overall mimicking the distribution from the MC sample.
- However at the outer cells, it gives a little bit different shape.

2025/8/28

# Attempts to improve the MSE loss

- We have try to add energy-depending penalty terms into the loss function but didn't works.

- Therefore we try a different direction, try to change the noise strength that we have added into the generated image.



Noise Strength Comparison Across 50 Epochs with Modified Schedules
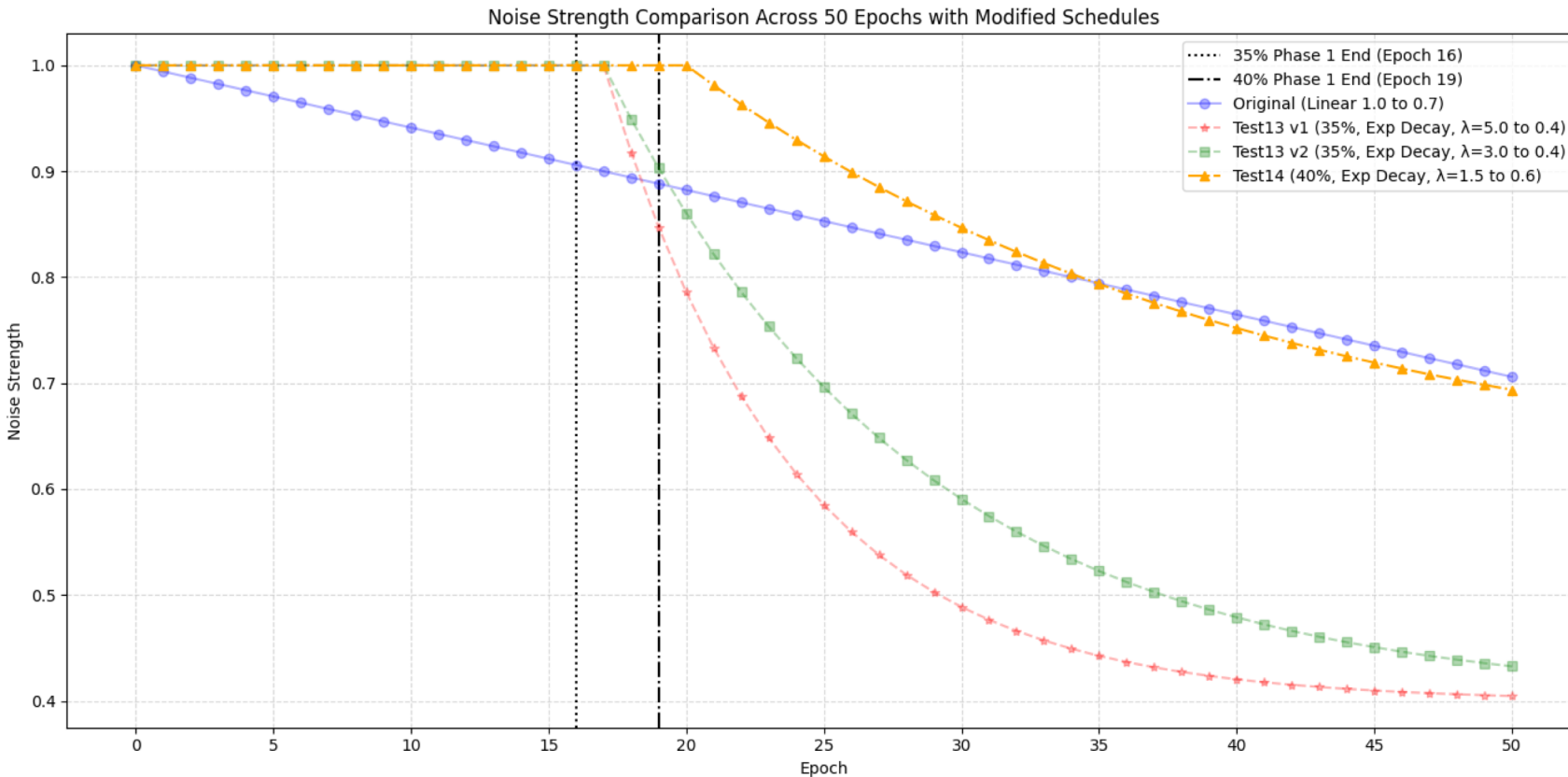
- In principle, the discriminator should be easier to distinguish the generated samples and the MC samples if the generated samples are much noisier.

- On the other hand, if we keep reducing the noise level, the generated sample would be much "sharper".

- However, the linear schedule would be easy for the discriminator to predict how the generated sample change.

- Therefore we can try to use the decay schedule. Also we try to keep the noise strength = 1 in order to keep the randomness at the beginning.

# Decay noise strength



Noise Strength Comparison Across 50 Epochs with Modified Schedules
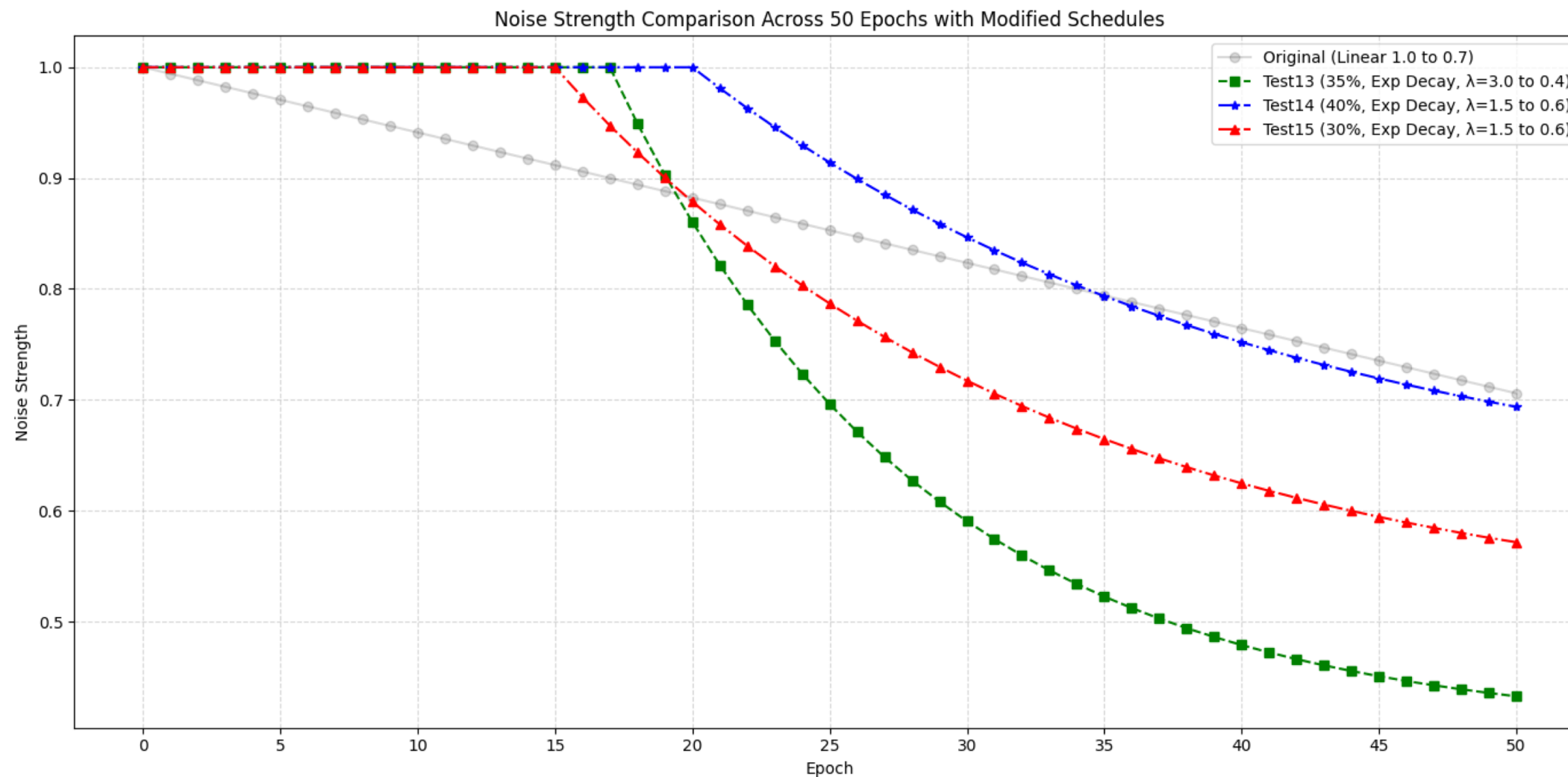
# Decay noise strength: Result
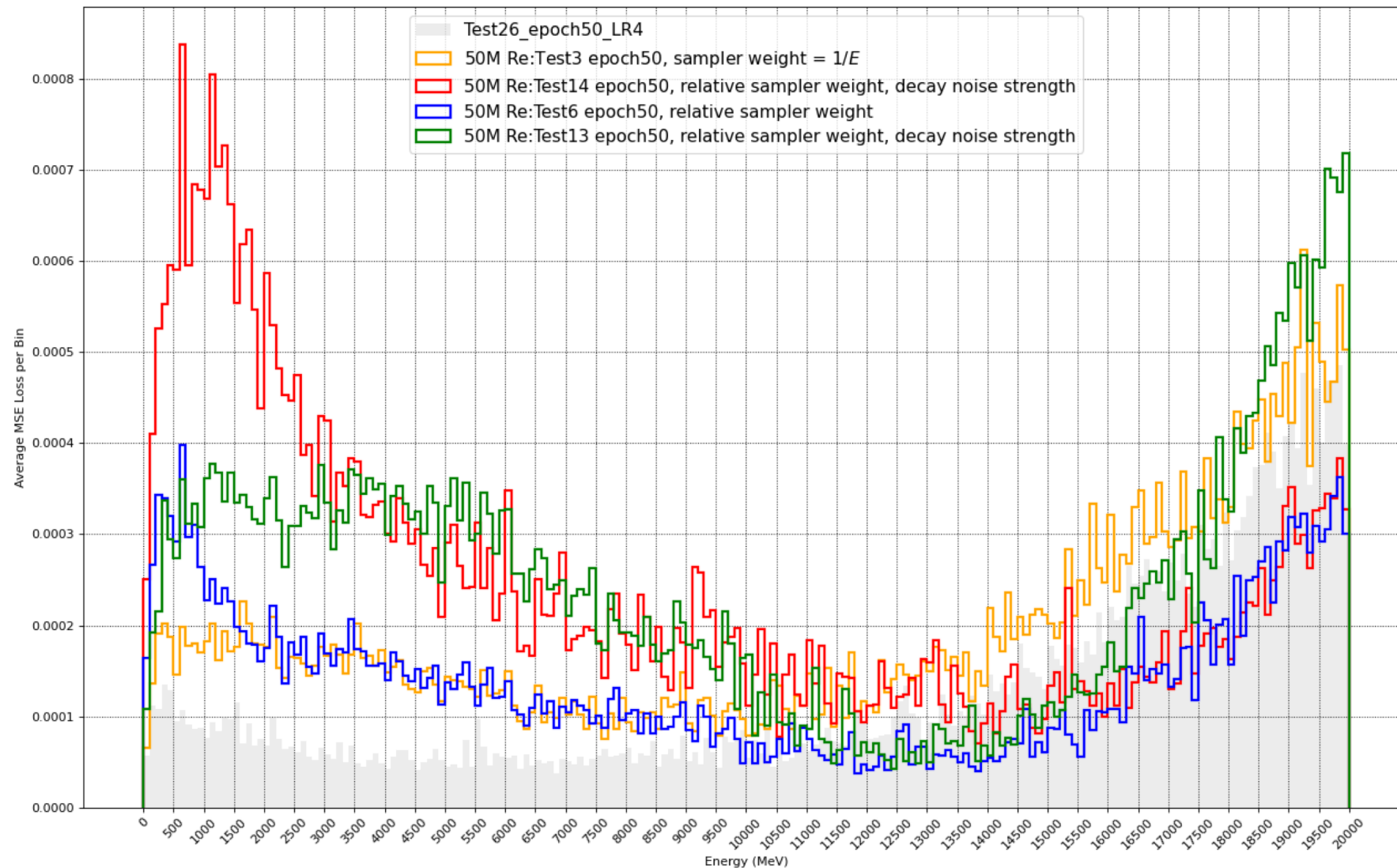


- Still running the test 15.

- At the moment nothing can beat the best performance (Test6).

- We can also try something else in the noise strength schedule (e.g. smoother functions)