Progress Report

ZHH Meeting | 2026/06/10

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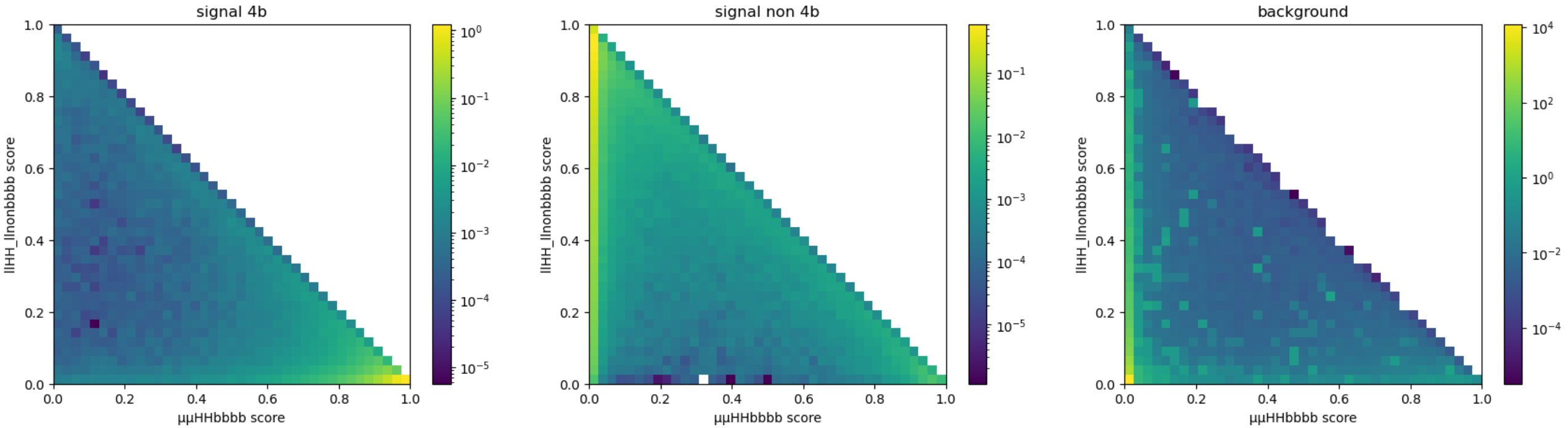
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Optimization in the Muon Channel



- 2D Histograms of signal classes (4b vs non-4b)

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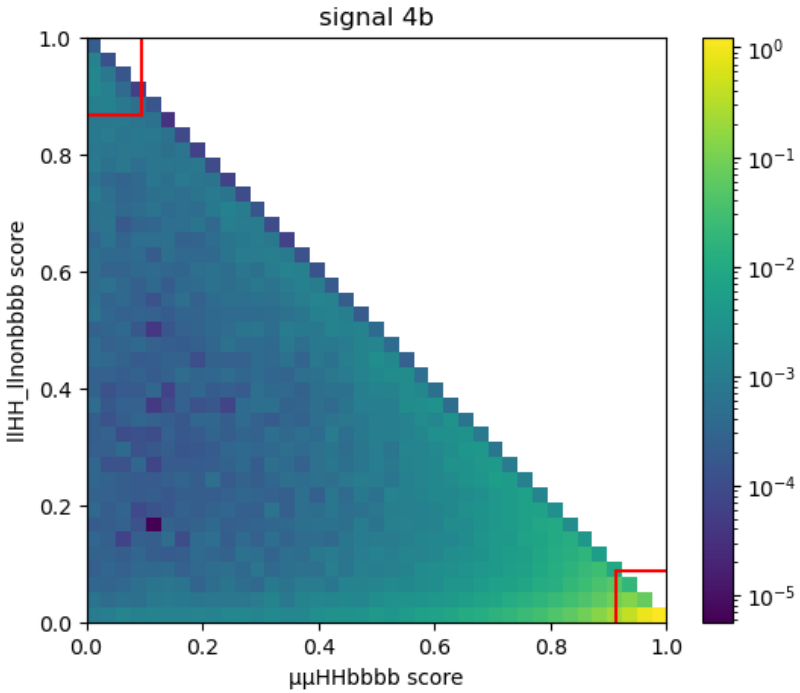

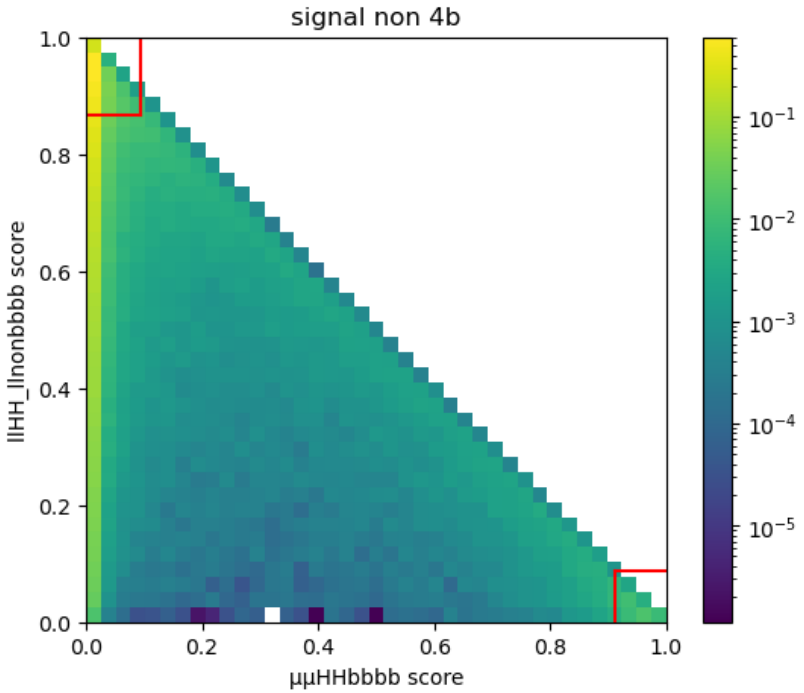

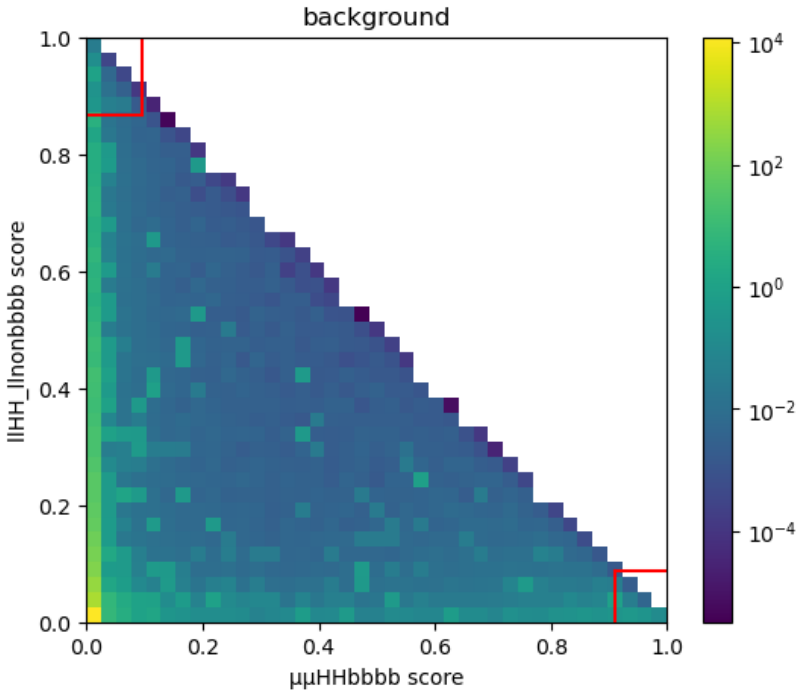

- 2D Histograms of signal classes (4b vs non-4b)
- Optimizing using boxes at the high-signal probabilities
- Fit box sizes by maximizing significance (1=4b, 2=non-4b)
  as done previously: total signal vs total background

$$Z = \frac{s_1 + s_2}{\sqrt{s_1^2 + s_2^2 + b}}$$

```
391471 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.12 significance=1.899
391467 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.12 significance=1.899
391469 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.12 significance=1.899
391468 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.12 significance=1.899
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391465 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.12 significance=1.899
391463 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.12 significance=1.899
391464 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.12 significance=1.899
391462 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.12 significance=1.899
391458 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.1 significance=1.902
391459 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.1 significance=1.902
391456 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.1 significance=1.902
391455 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.1 significance=1.902
391449 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.1 significance=1.902
391452 0.911, 0.0888, 0.0954, 0.867 Nsig=5.61 Nbkg=3.1 significance=1.902
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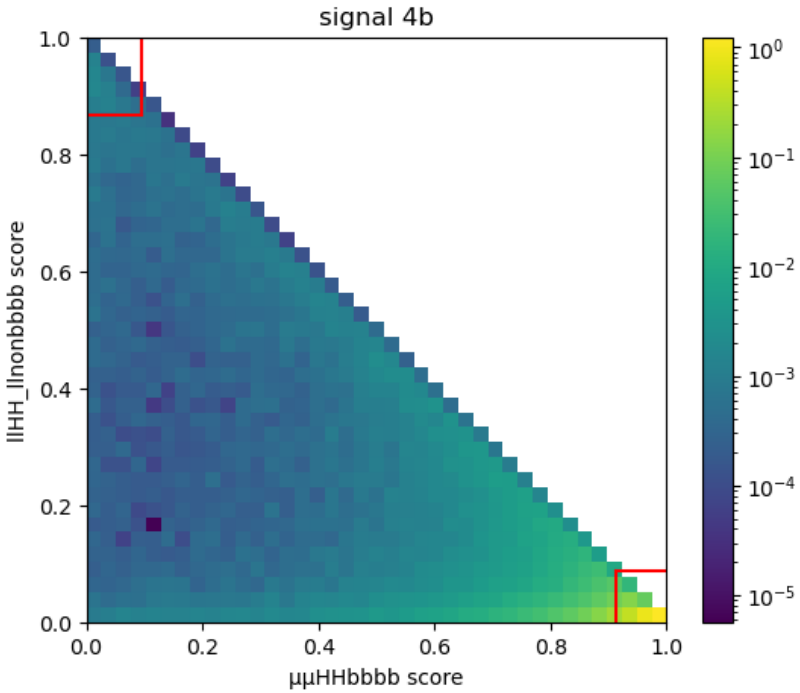
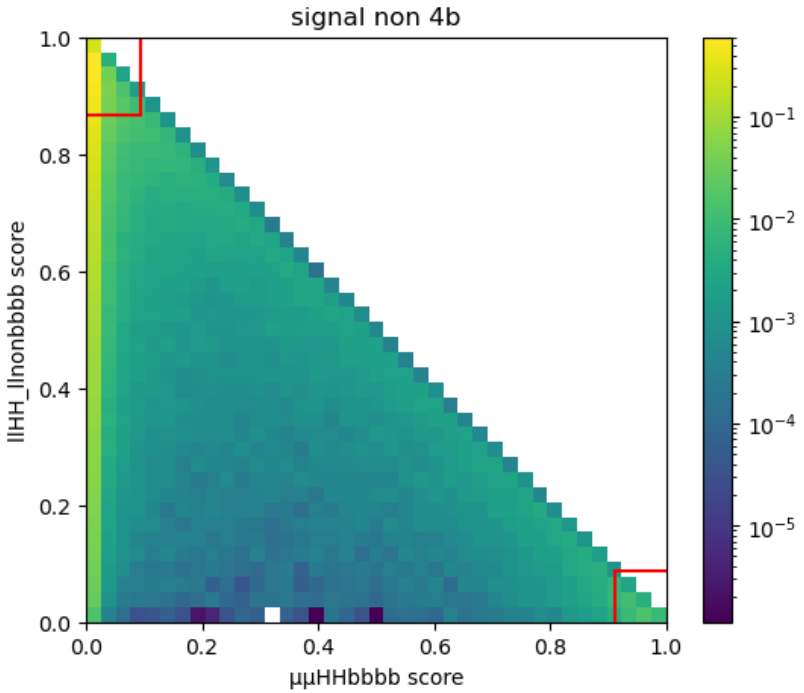
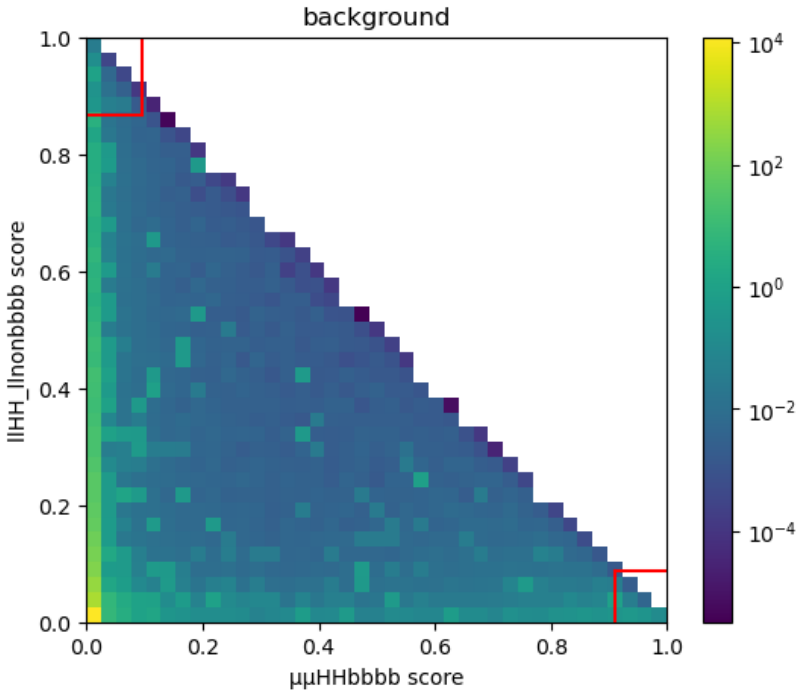
Z

Optimization in the Muon Channel







- 2D Histograms of signal classes (4b vs non-4b)
- Optimizing using boxes at the high-signal probabilities
- Fit box sizes by maximizing significance (1=4b, 2=non-4b)
  with statistically independent categories

```
4b 202734 0.911, 0.102, 0.101, 0.865 Nsig=2.96 Nbkg=1.89 significance=1.346
non-4b 192091 0.911, 0.102, 0.101, 0.865 Nsig=2.69 Nbkg=2.08 significance=1.233
1.8249211425521765
4b 202768 0.911, 0.102, 0.101, 0.865 Nsig=2.96 Nbkg=1.89 significance=1.346
non-4b 191951 0.911, 0.102, 0.101, 0.865 Nsig=2.69 Nbkg=2.08 significance=1.232
1.824701375990074
4b 202525 0.911, 0.102, 0.101, 0.865 Nsig=2.96 Nbkg=1.07 significance=1.474
non-4b 192076 0.911, 0.102, 0.101, 0.865 Nsig=2.69 Nbkg=2.08 significance=1.233
1.9214750846356536
```

Z

$$Z = \sqrt{Z_1^2 + Z_2^2};\ Z_i = \frac{s_i}{\sqrt{s_i + b_i}}$$

Muon Channel (previously, using sum of scores)