

# Status of the $4\ell + E_T^{\text{miss}}$ analysis

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# Unblinding approval and plans for the publication

2

- The HDBS and HBSM convenors agreed to decouple the unblinding approval from the study on the sensitivity of the analysis with large width signals.
- Plans for the publication:
  - Proceeding ahead with the unblinding
  - Producing unblinding results and updating the note
  - We will use the NWA result as our main result for the paper
  - We should work on writing the paper in parallel with all that.
- In the paper we should add a statement about the validity of the NWA for the analysis and tell how the limits degrade as a function of the A/H width.
- For the HDBS approval, we need to show at least the signal selection efficiency study for the large-width samples. (we need to generate a few samples)
- Target and Deadlines: we aim for the results to go to Moriond, but we have a very tight schedule.

Conference	Date of conference	Editorial Board Request	Public paper plots	Single Circ to arxiv	Single Circ to public plots	CONF-conversion	CONF note	Summary plots
<a href="#">MoriondEW 2023</a>	18-25 Mar 2023	5 Dec 2022 (iv)	3 Feb 2023	10 Feb 2023	24 Feb 2023	24 Feb 2023	3 Mar 2023	8 Mar 2023
<a href="#">MoriondQCD 2023</a>	25 Mar-1 Apr 2023	5 Dec 2022 (iv)	10 Feb 2023	17 Feb 2023	3 Mar 2023	3 Mar 2023	10 Mar 2023	15 Mar 2023
<a href="#">Hard Probes 2023</a>	26-31 Mar 2023	5 Dec 2022 (iv)	10 Feb 2023	17 Feb 2023	3 Mar 2023	3 Mar 2023	10 Mar 2023	16 Mar 2023
<a href="#">LHCP 2023</a>	22-27 May 2023	27 Feb 2023	7 Apr 2023	14 Apr 2023	28 Apr 2023	28 Apr 2023	5 May 2023	12 May 2023
<a href="#">Initial Stages 2023</a>	19-24 Jun 2023	27 Mar 2023	5 May 2023	12 May 2023	26 May 2023	26 May 2023	2 Jun 2023	9 Jun 2023
<a href="#">Lepton Photon 2023</a>	17-21 Jul 2023	24 Apr 2023	2 Jun 2023	9 Jun 2023	23 Jun 2023	23 Jun 2023	30 Jun 2023	7 Jul 2023
<a href="#">EPS 2023</a>	21-25 Aug 2023	29 May 2023	7 Jul 2023	14 Jul 2023	28 Jul 2023	28 Jul 2023	4 Aug 2023	11 Aug 2023
<a href="#">Quark Matter 2023</a>	3-9 Sep 2023	9 Jun 2023	21 Jul 2023	28 Jul 2023	11 Aug 2023	11 Aug 2023	18 Aug 2023	24 Aug 2023

# How do the limits degrade with LWA signals?

Generating LWA signal samples for  $A \rightarrow ZH \rightarrow 4\ell + E_T^{\text{miss}}$

3

- Because of the huge statistics required, we can only request generating two mass points.
- We selected  $(m_A, m_H) = (320, 220)$  and  $(1190, 600)$  GeV mass points for each of the  $A \rightarrow Z(\rightarrow X)H(\rightarrow 4\ell)$  and  $A \rightarrow Z(\rightarrow 2\ell)H(\rightarrow 2\ell + X)$  signal models to be generated.
- The widths for the  $A$  and  $H$  are as follows: (see the other slides)
  - $A$  widths: 30% and 15%
  - $H$  widths: 10% and 5%
- So we will have eight samples with 4.8 million evens. The statistics can be broken down as follows: 150k, 200k, and 250k for mc16a, mc16d and mc16e, respectively, for each sample using AFII simulation. I'm not sure if this number will be approved. We will know by Thursday after the HBSM meeting as we will give a request talk there.
- A suggestion from the convenors: "It would be great if the team could develop a re-weighting method at truth level to re-weight samples with max. width to smaller widths in parallel so that we can evaluate if such a re-weighting is possible. We would also like to understand the amount of work needed and finally the delay it will cause."
  - Due to lake of workforce this task will be hard to do as it involves fine-tuning .