

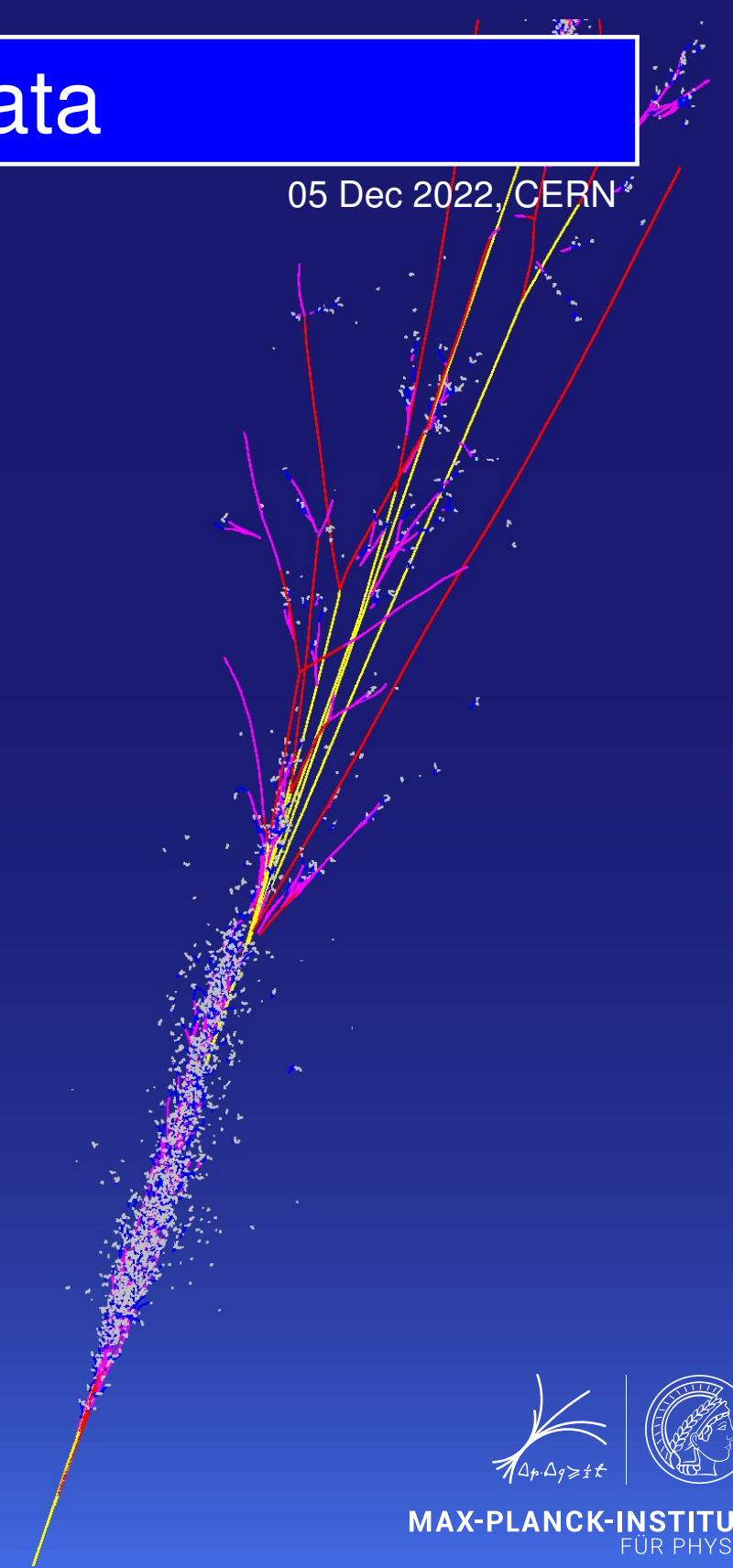
Reduced HV FCal1 + EMEC IW Data

FCalPulse Meeting

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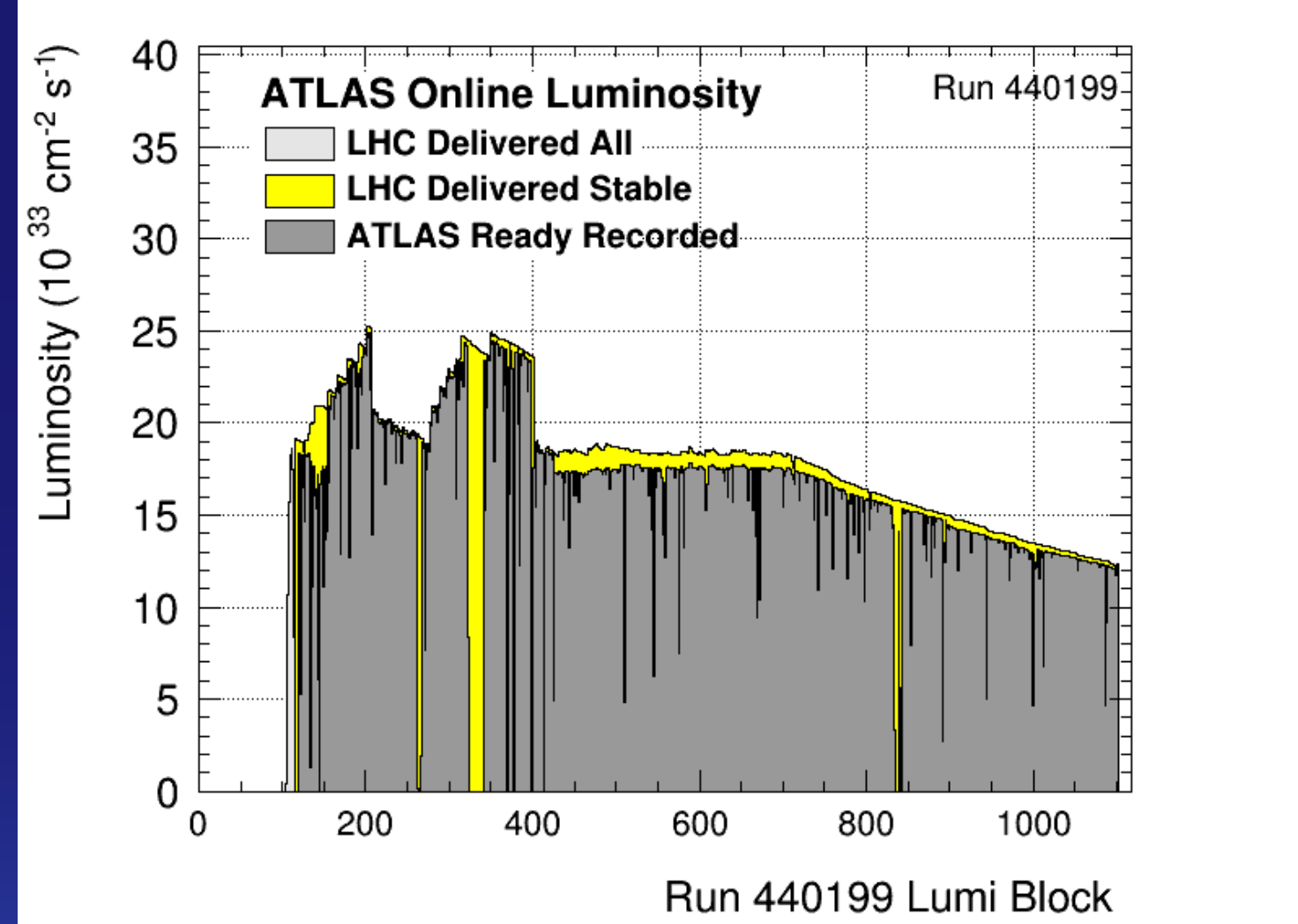
05 Dec 2022, CERN

- ▶ Introduction
 - High-luminosity test run we could use to "play" with HV
- ▶ High voltage settings for FCal1 and EMEC IW
- ▶ Data taken with lowered HV
 - standard readout with 4 samples
 - 32-sample readout for digital trigger (SuperCells)



► Special LHC fill to test heat load limit of inner triplet

- aimed to reach $L > 2.0 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$
- not used for physics
 - ▶ this allows us to test lowered HV patterns in the FCal1 and the EMEC IW where we expect to be space charge limited at the HL-LHC
 - ▶ the lowered HV is needed to already be space-charge limited at lower luminosities (like the target of $2 \times$ the LHC design lumi)
- the run did happen on 21 Nov 2022 and reached $L = 2.53 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$
 - ▶ Run number [440199](#)
 - ▶ See Davide Mungo's **slides** from LAr weekly on 28-Nov-2022
 - ▶ Full **e**log entry
 - ▶ Digital trigger rate at 50 - 70 kHz with 32-sample readout in MON-path



High voltage settings for FCal1 and EMEC IW

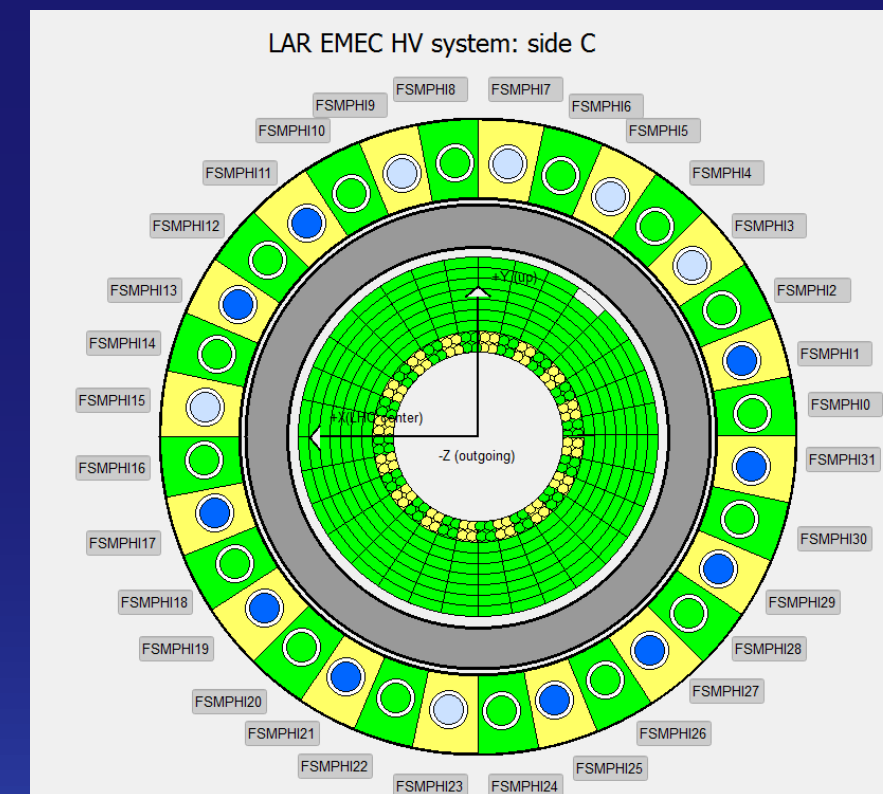
► FCal1 HV

- same pattern as for previous low HV runs:
 - ▶ alternating 36 / 150 V on A/C-side and nominal 250 V φ -sectors
 - ▶ reduced HV configuration for FCAL valid starting from LB 156
 - ▶ since SuperCells are always within one φ -segment the HV settings are also o.k. for pulse-shape studies with the digital trigger

► EMEC IW

- there are 2 HV boards serving the inner wheel:
 - ▶ B7 with nominal 2300 V for $2.5 < |\eta| < 2.8$
 - ▶ B8 with nominal 1800 V for $2.8 < |\eta| < 3.2$
- the segmentation in φ is 0.1 for the HV lines
- SuperCells cover 0.2 in φ and the boundaries in $|\eta|$ are 2.5, 2.7, 2.9, 3.1 and 3.2
- problematic is the region $2.7 < |\eta| < 2.9$ as it is covered by both B7 and B8
- reduced pattern EMEC IW A/C: 270 / 540 V alternating with nominal every 0.2 in φ for B7 and B8
 - ▶ the elog mentions only the 1800 V as nominal voltage
 - ▶ need to check if B7 was indeed lowered to same values as B8

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▶ Legacy readout

- the legacy readout was taken with the standard 4 samples
 - ▶ this is not sufficient to study pulse shapes

▶ Digital Trigger (DT) readout

- on the monitoring (MON) path the digital trigger pulse shapes are recorded with 32 samples per SuperCell
 - ▶ the DT ran with BCID-correction enabled
 - ▶ if I understood well from Yuji Enary the DT BCID correction averages 1024 samples per SuperCell and BCID and subtracts this from the values written out
 - ▶ the values are updated every 10 - 15 s
 - ▶ the corrections themselves are never written out
 - ▶ there is no way to undo the BCID-corrections
- still had no time to look at actual data
 - ▶ maybe large enough pulses are o.k. or some averaging of cells in φ or ...