LumiDays 25

Report of Contributions

https://indico.cern.ch/e/1502802

Contribution ID: **1** Type: **not specified**

Welcome –workshop program, goals and scope

Monday 10 March 2025 14:00 (10 minutes)

Presenter: STICKLAND, David (Princeton University (US))

Session Classification: Luminosity determination in Run III, and associated uncertainties

Contribution ID: **2** Type: **not specified**

Overview of ATLAS luminosity determination

Monday 10 March 2025 14:10 (30 minutes)

Overview of ATLAS luminosity-determination methodology in Run III, and comparison to Run-II methodology (both pp and HI)
Introduction to common vdM [avoid duplication in next talk!]
• Global view of:
- calibration strategy: vdM, LSC, calibration-transfer / non-linearity corrections, instrumental corrections, …
- long-term monitoring strategy, conceptual definition of CT + LTS systematic uncertainties
• Description of calibration procedures (vdM scans, LSC, calibration-transfer, instrumental corrections) & associated systs
• What was achieved; key issues

Presenter: COLE, Brian Andrew (Columbia University (US))

Session Classification: Luminosity determination in Run III, and associated uncertainties

Contribution ID: **3** Type: **not specified**

Overview of CMS luminosity determination

Monday 10 March 2025 14:50 (30 minutes)

Overview of CMS luminosity-determination methodology in
Run III, and comparison to Run-II methodology (both pp and HI)

• Global view of
- calibration strategy: vdM, LSC, calibration-transfer / non-linearity corrections, instrumental corrections, ...
- long-term monitoring strategy, conceptual definition of CT + LTS systematic uncertainties
• Description of calibration procedures (vdM scans, LSC, calibration-transfer, instrumental corrections) & associated systs
• What was achieved; key issues

Presenter: PASZTOR, Gabriella (Eötvös University, Budapest)

Session Classification: Luminosity determination in Run III, and associated uncertainties

Contribution ID: **4** Type: **not specified**

HI-specific vdM-calibration issues (ALICE Speaker)

Monday 10 March 2025 16:00 (25 minutes)

For instance: fitting procedures with challenging scan shapes; dealing with low-statistics in scan tails; BCID-dependent satellite corrections; satellite collisions; NF corrections; use of ZDC as high-statistics L monitor
Include HI-specific contributions from All experiments

Presenter: GAGLIARDI, Martino (Universita e INFN Torino (IT))

Session Classification: Luminosity determination in Run III, and associated uncertainties

Contribution ID: **5** Type: **not specified**

ALICE final Run-II luminosity measurements

Monday 10 March 2025 16:35 (15 minutes)

Presenter: Prof. CONTRERAS NUNO, Jesus Guillermo (Czech Technical University in Prague (CZ))

Session Classification: Luminosity determination in Run III, and associated uncertainties

Contribution ID: **6** Type: **not specified**

LHCb methods & techniques for luminosity measurements in pp collisions

Monday 10 March 2025 17:00 (25 minutes)

- Reminder of what was used in Run II, and main results
- brief intro to the new LHCb luminometers in Run III
- possibly some preliminary results for LHCb Run-III luminosity

Presenter: PASSARO, Daniele (SNS & INFN Pisa (IT))

Session Classification: Luminosity determination in Run III, and associated uncertainties

Contribution ID: **7** Type: **not specified**

Overview of the accelerator issues that impact the absolute luminosity calibrations at the LHC

Tuesday 11 March 2025 09:00 (30 minutes)

Presenter: KOZANECKI, Witold (University of Oregon (US))

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **8** Type: **not specified**

Sources & mitigation of non-factorization in the injectors & the LHC

Tuesday 11 March 2025 09:40 (20 minutes)

• mechanisms of generating non-factorization in the proton-density distributions, and its transport through the injector chain
• optimized beam preparation for vdM beams —how to optimize factorization already before the vdM fill (e.g. scraping measurements in LHC at injection to confirm factorization, further optimization of beam production schemes in the injectors
• collimation in the LHC?

Presenter: ASVESTA, Foteini (CERN)

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **9** Type: **not specified**

Results of the 2024 Non-factorization MD: accelerator measurements

Tuesday 11 March 2025 10:10 (15 minutes)

Presenter: LAMB, Elleanor

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **10** Type: **not specified**

LHCb non-factorization analyses

Tuesday 11 March 2025 11:00 (20 minutes)

- 2-D vdM analysis
- LHCb BGI results from the NF MD

Presenter: BALAGURA, Vladislav (Centre National de la Recherche Scientifique (FR))

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **11** Type: **not specified**

CMS non-factorization analyses

Tuesday 11 March 2025 11:30 (20 minutes)

2-D vdM, beam-beam imaging and LRE analyses
• Including CMS results from the NF MD?

Presenter: MAJOR, Peter (University of Maryland (US))

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **12** Type: **not specified**

ATLAS non-factorization analyses

Tuesday 11 March 2025 12:00 (20 minutes)

2-D vdM and LRE analyses
• Including ATLAS results from the NF MD?
• Include some ALICE LRE results if so requested

Presenter: BARKLOW, Tim (SLAC National Accelerator Laboratory (US))

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **13** Type: **not specified**

Tune measurements in vdM fills, before and during collisions

Tuesday 11 March 2025 16:00 (15 minutes)

Presenter: LEVENS, Tom (CERN)

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations

Contribution ID: **14** Type: **not specified**

LHC bunch-population measurements in Run III & beyond: a status report

Tuesday 11 March 2025 16:20 (20 minutes)

• DCCT, FBCT, BSRL: performance, issues, new developments.
• also: BPTX @ IP1 & IP5, w/ applicable functionalities; BQM
• also: 1-2 slides on planned HL-LHC upgrades of the beam instrumentation relevant to bunch-current measurements?

Presenter: JURY, Alexander Nicholas (University of Liverpool (GB))

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations

Contribution ID: **15** Type: **not specified**

LHCb ghost-charge measurements

Tuesday 11 March 2025 16:50 (15 minutes)

- Run-III results and performance to date
- brief mention of plans for further improvements

Presenter: MCHUGH, Niall Thomas (University of Glasgow (GB))

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations

Contribution ID: **16** Type: **not specified**

Follow-up questions and discussion

Tuesday 11 March 2025 17:30 (25 minutes)

Presenter: KOZANECKI, Witold (University of Oregon (US))

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations

Contribution ID: **17** Type: **not specified**

Impact of magnetic non-linearities, BPM performance & x-y coupling on ATLAS length-scale calibrations

Wednesday 12 March 2025 09:00 (25 minutes)

• including the systematic. uncertainties associated w/ DOROS-BPM performance limitations, e.g. non-reproducibility of the BPM length scale, their response to beam-beam deflections and their apparent out-of-plane coupling

Presenter: HAWKINGS, Richard (CERN)

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations

Contribution ID: **18** Type: **not specified**

Status report on LHC beam-position measurements at the experimental IPs

Wednesday 12 March 2025 09:35 (15 minutes)

• DOROS BPMs: improvements since the start of Run III, performance, known limitations & issues
• Brief comments about Arc BPMS in the context of orbit-drift monitoring?

Presenter: Dr GASIOR, Marek (CERN)

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations

Contribution ID: **19** Type: **not specified**

BPM- and BGI-based beam-displacement measurements at IP8

Wednesday 12 March 2025 10:00 (20 minutes)

Presenter: BALAGURA, Vladislav (Centre National de la Recherche Scientifique (FR))

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations

Contribution ID: **21** Type: **not specified**

What have the Experiments learnt from emittance scans, and what can we do better?

Presenter: STICKLAND, David (Princeton University (US))

Session Classification: Luminometer non-linearities and integration uncertainties

Contribution ID: **22** Type: **not specified**

Long term stability, non-linearity corrections, integration methodologies and systematic uncertainties in CMS

Wednesday 12 March 2025 11:50 (30 minutes)

Presenter: ROMEO, Francesco (Vanderbilt University)

Session Classification: Luminometer non-linearities and integration uncertainties

Contribution ID: **23** Type: **not specified**

Calibration-transfer and long-term stability in ATLAS: corrections & systematic uncertainties.

Wednesday 12 March 2025 14:00 (25 minutes)

Examples of corrections that could be mentioned:
• LUCID HV adjustments based on Bi calibrations
• LUCID non-linearity correction using track-counting-based L
Examples of systematics that could be discussed:
• CT uncertainty (from TILE/tracks)
• Anchoring uncertainty
• Long-term stability & consistency uncertainty

Presenter: RIPELLINO, Giulia (Uppsala University (SE))

Session Classification: Luminometer non-linearities and integration uncertainties

Contribution ID: **24** Type: **not specified**

Use of reference physics processes for long-term relative-stability monitoring

Wednesday 12 March 2025 14:30 (25 minutes)

For instance:
• in pp: Z-, but also J/psi- & Upsilon- counting
• in PbPb: UPC dimuons (CMS)
• in PbPb: photonuclear signatures in the ZDCs

Presenter: WALTER, David (Massachusetts Inst. of Technology (US))

Session Classification: What can we do better in the remainder of Run III, and looking to Run 4

Contribution ID: **25** Type: **not specified**

New LHCb luminometers in Run III

Wednesday 12 March 2025 15:05 (20 minutes)

what has LHCB learnt from PLUME (and other luminometers) in
Run III, and how it informs the LHCb strategy for Run 4

Presenter: FRANZOSO, Edoardo (Universita e INFN, Ferrara (IT))

Session Classification: What can we do better in the remainder of Run III, and looking to Run 4

Contribution ID: **26** Type: **not specified**

First experience with the ALICE FIT system as an online luminometer

Session Classification: What can we do better in the remainder of Run III, and looking to Run 4

Contribution ID: **27** Type: **not specified**

Looking to Run 4: ATLAS Run-3 experience with LUCID prototypes for HL- LHC

Wednesday 12 March 2025 16:00 (20 minutes)

Presenter: HEDBERG, Vincent (Lund University (SE))

Session Classification: What can we do better in the remainder of Run III, and looking to Run 4

Contribution ID: **28** Type: **not specified**

Looking to Run 4 in CMS

Wednesday 12 March 2025 16:30 (20 minutes)

For instance (under consideration; not an exhaustive list):
• experience with BCM1F in Run 3, and how it informs the CMS strategy for Run 4
• proposal for very-high μ (μ > 120) fill with a mixture of indivs & trains (as done in 2016) for characterizing the BCID-dependent response, and the relative μ-dependence, of the CMS luminometers (also of interest to ATLAS)
• scouting
• outer-tracker potential for L monitoring in Run 4 (simulation results)

Presenter: SHEVELEV, Alexey (University of Maryland (US))

Session Classification: What can we do better in the remainder of Run III, and looking to Run 4

Contribution ID: **29** Type: **not specified**

Discussion and Closeout

Wednesday 12 March 2025 17:00 (10 minutes)

Session Classification: What can we do better in the remainder of Run III, and looking to Run 4

Contribution ID: **30** Type: **not specified**

Summary of beam-beam simulation studies during LS2

Tuesday 11 March 2025 14:00 (25 minutes)

Summary of the beam-beam papers, with the emphasis on
(i) bb-related vdM uncertainties as currently understood, and
(ii) pending issues

Presenter: KOZANECKI, Witold (University of Oregon (US))

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **31** Type: **not specified**

Recent developments in beam-beam studies

Tuesday 11 March 2025 14:35 (20 minutes)

For instance:
• Results of the 2022 beam-beam MD
• New simulation results on Lu/L0 ambiguity
• Interplay between beam-beam & non-factorization biases

Presenter: WANCZYK, Joanna

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **32** Type: **not specified**

Generalization of parameterized beam-beam corrections to 2-D vdM scans

Tuesday 11 March 2025 15:05 (15 minutes)

Presenter: KRALIK, Ivan (Slovak Academy of Sciences (SK))

Session Classification: Impact of beam dynamics on vdM calibrations

Contribution ID: **33** Type: **not specified**

Emittance evolution in physics and luminosity-calibration fills: what measurements do we have and what did we learn from them?

Presenter: KOSTOGLOU, Sofia (CERN)

Contribution ID: **34** Type: **not specified**

Emittance evolution in physics and luminosity-calibration fills: what measurements do we have and what did we learn from them?

Wednesday 12 March 2025 11:00 (25 minutes)

Presenter: KOSTOGLOU, Sofia (CERN)

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations

Contribution ID: **35** Type: **not specified**

Uses of Emittance Scans and Planning for 25-26

Wednesday 12 March 2025 11:30 (15 minutes)

- How are LHC experiments and LHC Operations using Emittance scans today
- Is there a preference for early or late scans
- How frequently should they be run
- List improvements that either have been implemented in the analysis since Run II , or are definitely needed (e.g.: BB corrections, all expts), or are being dreamt about (e.g. characterization of long-range BB effects in the scans with trains)

Presenter: STICKLAND, David (Princeton University (US))

Session Classification: Luminometer non-linearities and integration uncertainties

Contribution ID: **36** Type: **not specified**

Numerical Tools for Studying Beam Dynamics Effects on Luminosity Calibration: COMBI and XSUITE

Tuesday 11 March 2025 17:10 (15 minutes)

- XSUITE: Overview and Recent Luminosity Developments
- Benchmarking Luminosity Calculations: COMBI vs. XSUITE (private version)
- First Studies on Linear Coupling (Local and Global) as an Example Case
- Potential Uses of XSUITE in Future Studies and Plans (e.g., adding the entire LHC lattice, including errors, long-range beam-beam interactions, etc.)

Presenter: Dr PIELONI, Tatiana (EPFL)

Session Classification: Impact of accelerator instrumental issues on luminosity calibrations