ATLAS Note

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PubCom standard references

ATLAS Publication Committee Chairs

This note contains standard references that should be used in ATLAS documents. The references can all be found in the standard ATLAS BibTeX files provided by the `atlaslatex` package. This document supersedes the TWiki page: PubComUsefulBibTex.

Editors of the document should follow the conventions described in Appendix A.

Contents

1 Introduction

This page contains a number of BibTeX entries for papers which are commonly referenced in ATLAS CONF notes and papers, and recommended by the performance and physics groups. For ATLAS publications the BibTeX key is provided, simply type `\cite{key}`, where key is, for example, EXOT-2016-19. The BibTeX files can be found within the `atlaslatex` package or on the page https://atlas-po.docs.cern.ch/atlaslatex/references/. It is recommended to use the standard bibliography files instead of extracting the individual BibTeX entries into your paper `bib` file, since there may be updates, errata, etc. made to the standard `bib` files. Using the latest version of the standard `bib` files before the final sign-off stage will avoid a number of late fixes to the references.

The references mentioned here can mostly be found in the `ATLAS.bib` and `ATLAS-useful.bib` files from the `atlaslatex` package.

2 HEP experiments and accelerators
Last update: 2025-06-30

2.1 Experiments

2.1.1 ATLAS

- `PERF-2007-01` [1] in `ATLAS.bib`.
- For IBL in Run 2: `ATLAS-TDR-19` [2] (which calls `ATLAS-TDR-19-addm` [3] internally) and `PIX-2018-001` [4] in `ATLAS.bib`.
- For Run 3 configuration: `GENR-2019-02` [5] in `ATLAS.bib`.

2.1.2 CMS

- `CMS-TDR-08-001` [6] in `CMS.bib`.

2.2 Accelerators

2.2.1 LHC

- `Evans:2008zzb` [7] in `ATLAS-useful.bib`.

2.3 Beam energy

Papers that need to refer to the 0.1% beam energy uncertainty, should refer to the following paper:

- `PhysRevAccelBeams.20.081003` [8] from `ATLAS-useful.bib`.

2.4 Luminosity

2.4.1 Run 1

- First publication including methods (2010 data)
  `DAPR-2010-01` [9] in `ATLAS.bib`.
- Updated publication (2010 and 2011 data)
  `DAPR-2011-01` [10] in `ATLAS.bib`.
- Most recent Run 1 publication (2012 data)
  `DAPR-2013-01` [11] in `ATLAS.bib`.

2.4.2 Run 2 and/or Run 3

Please follow the recommendations from LuminosityForPhysics. For *pp* data, the current recommendation is to quote the Run 2 luminosity paper and the LUCID2 paper

2.5 Data Quality

2.5.1 Run 2 and/or Run 3

Quote the Run 2 data quality paper (`DAPR-2018-01` [12] in `ATLAS.bib`) when mentioning data quality requirements.

References

[1] ATLAS Collaboration, *The ATLAS Experiment at the CERN Large Hadron Collider*, JINST **3** (2008) S08003.

[2] ATLAS Collaboration, *ATLAS Insertable B-Layer: Technical Design Report*, ATLAS-TDR-19; CERN-LHCC-2010-013, 2010, URL: https://cds.cern.ch/record/1291633, Addendum: ATLAS-TDR-19-ADD-1; CERN-LHCC-2012-009, 2012, URL: https://cds.cern.ch/record/1451888.

[3] ATLAS Collaboration, ATLAS-TDR-19-ADD-1; CERN-LHCC-2012-009, 2012, URL: https://cds.cern.ch/record/1451888.

[4] B. Abbott et al., *Production and integration of the ATLAS Insertable B-Layer*, JINST **13** (2018) T05008, arXiv: 1803.00844 [physics.ins-det].

[5] ATLAS Collaboration, *The ATLAS experiment at the CERN Large Hadron Collider: a description of the detector configuration for Run 3*, JINST **19** (2024) P05063, arXiv: 2305.16623 [physics.ins-det].

[6] CMS Collaboration, *The CMS experiment at the CERN LHC*, JINST **3** (2008) S08004.

[7] L. Evans and P. Bryant, *LHC Machine*, JINST **3** (2008) S08001.

[8] E. Todesco and J. Wenninger, *Large Hadron Collider momentum calibration and accuracy*, Phys. Rev. Accel. Beams **20** (2017) 081003.

[9] ATLAS Collaboration,
Luminosity determination in pp collisions at $\sqrt{s} = 7$ TeV using the ATLAS detector at the LHC, Eur. Phys. J. C **71** (2011) 1630, arXiv: 1101.2185 [hep-ex].

[10] ATLAS Collaboration, *Improved luminosity determination in pp collisions at $\sqrt{s} = 7$ TeV using the ATLAS detector at the LHC*, Eur. Phys. J. C **73** (2013) 2518, arXiv: 1302.4393 [hep-ex].

[11] ATLAS Collaboration,
Luminosity determination in pp collisions at $\sqrt{s} = 8$ TeV using the ATLAS detector at the LHC, Eur. Phys. J. C **76** (2016) 653, arXiv: 1608.03953 [hep-ex].

[12] ATLAS Collaboration, *ATLAS data quality operations and performance for 2015–2018 data-taking*, JINST **15** (2020) P04003, arXiv: 1911.04632 [physics.ins-det].

3 Inner Tracking
Last update: 2025-06-31

Public results from the ATLAS Tracking Performance Group are reported on this page: InDetTrackingPerformanceApprovedPlots.

The most relevant publications for every LHC run are reported below.

3.1 Track reconstruction

3.1.1 Run 1

Performance of the ATLAS Inner Detector Track and Vertex Reconstruction in the High Pile-Up LHC Environment:
`ATLAS-CONF-2012-042` [1] in `ConfNotes.bib`.

3.1.2 Run 2

Performance of the ATLAS Track Reconstruction Algorithms in Dense Environments in LHC Run 2 (track selections, performance, and efficiency uncertainties inside dense environments (jets, taus, etc)):
`PERF-2015-08` [2] in `ATLAS.bib`.

Early Inner Detector Tracking Performance in the 2015 data at $\sqrt{s} = 13$ TeV (track selections and inclusive tracking uncertainties including efficiency, fake rate, alignment, and impact parameters):
`ATL-PHYS-PUB-2015-051` [3] in `PubNotes.bib`.

Plots showing the impact of IBL distortions on the tracking can be found here and here.

Comparison between 2012 Run 1 and 2015 Run 2 detector configuration for the transverse and longitudinal impact parameters, mainly showing the impact of the IBL:
`GENR-2019-02` [4] in `ATLAS.bib`.

3.1.3 Run 3

Performance of ATLAS Pixel Detector and Track Reconstruction at the start of Run 3 in LHC Collisions at $\sqrt{s} = 900$ GeV:
`ATL-PHYS-PUB-2022-033` [5] in `PubNotes.bib`.

Track reconstruction software performance in Run 3:
`IDTR-2022-04` [6] in `ATLAS.bib`.

Performance of the reconstruction of large impact parameter tracks in the inner detector of ATLAS: IDTR-2021-03 [7] in ATLAS.bib.

3.1.4 Run 4

Expected Tracking Performance of the ATLAS Inner Tracker at the High-Luminosity LHC: IDTR-2023-01 [8] in ATLAS.bib.

3.2 Vertex reconstruction

3.2.1 Run 1

Reconstruction of primary vertices at the ATLAS experiment in Run 1 proton–proton collisions at the LHC PERF-2015-01 [9] in ATLAS.bib.

3.2.2 Run 2

Vertex Reconstruction Performance: ATL-PHYS-PUB-2015-026 [10] in PubNotes.bib.

3.2.3 Run 3

Development of ATLAS Primary Vertex Reconstruction for LHC Run 3: ATL-PHYS-PUB-2019-015 [11] in PubNotes.bib.

Performance plots for the ATLAS Track and Vertex Reconstruction in early LHC Run 3: plots.

3.2.4 Run 4

Expected Tracking Performance of the ATLAS Inner Tracker at the High-Luminosity LHC: IDTR-2023-01 [8] in ATLAS.bib.

3.3 Alignment

3.3.1 Run 1

Alignment of the ATLAS Inner Detector and its Performance in 2012: ATLAS-CONF-2014-047 [12] in ConfNotes.bib.

3.3.2 Run 2

Alignment of the ATLAS Inner Detector with the initial LHC data at 13 TeV:
`ATL-PHYS-PUB-2015-031` [13] in `PubNotes.bib`.

Plots showing the impact of IBL distortions on the alignment can be found here.

Alignment of the ATLAS Inner Detector in Run 2:
`IDTR-2019-05` [14] in `ATLAS.bib`.

3.3.3 Run 3

Inner Detector alignment development and performance in preparation for Run 3:
`ATL-PHYS-PUB-2022-028` [15] in `PubNotes.bib`.

3.4 Material

3.4.1 Run 1

A measurement of material in the ATLAS tracker using secondary hadronic interactions in 7 TeV *pp* collisions:
`PERF-2015-06` [16] in `ATLAS.bib`.

3.4.2 Run 2

Study of the material of the ATLAS inner detector for Run 2 of the LHC:
`PERF-2015-07` [17] in `ATLAS.bib`.

3.4.3 Run 4

Expected Tracking Performance of the ATLAS Inner Tracker at the High-Luminosity LHC:
`IDTR-2023-01` [8] in `ATLAS.bib`.

3.5 NN Clustering

3.5.1 Run 1

A neural network clustering algorithm for the ATLAS silicon pixel detector:
`PERF-2012-05` [18] in `ATLAS.bib`.

3.5.2 Run 2

Training and validation of the ATLAS pixel clustering neural networks:
`ATL-PHYS-PUB-2018-002` [19] in `PubNotes.bib`.

Performance of the ATLAS track reconstruction algorithms in dense environments in LHC Run 2:
`PERF-2015-08` [2] in `ATLAS.bib`.

3.5.3 Run 3

Performance of charged-particle reconstruction in energetic jets for Run 3 data taking with the ATLAS detector: plots.

References

[1] ATLAS Collaboration, *Performance of the ATLAS Inner Detector Track and Vertex Reconstruction in the High Pile-Up LHC Environment*, ATLAS-CONF-2012-042, 2012, URL: https://cds.cern.ch/record/1435196.

[2] ATLAS Collaboration, *Performance of the ATLAS track reconstruction algorithms in dense environments in LHC Run 2*, Eur. Phys. J. C **77** (2017) 673, arXiv: 1704.07983 [hep-ex].

[3] ATLAS Collaboration, *Early Inner Detector Tracking Performance in the 2015 Data at* $\sqrt{s} = 13$ *TeV*, ATL-PHYS-PUB-2015-051, 2015, URL: https://cds.cern.ch/record/2110140.

[4] ATLAS Collaboration, *The ATLAS experiment at the CERN Large Hadron Collider: a description of the detector configuration for Run 3*, JINST **19** (2024) P05063, arXiv: 2305.16623 [physics.ins-det].

[5] ATLAS Collaboration, *Performance of ATLAS Pixel Detector and Track Reconstruction at the start of Run 3 in LHC Collisions at* $\sqrt{s} = 900$ *GeV*, ATL-PHYS-PUB-2022-033, 2022, URL: https://cds.cern.ch/record/2814766.

[6] ATLAS Collaboration, *Software Performance of the ATLAS Track Reconstruction for LHC Run 3*, Comput. Softw. Big Sci. **8** (2024) 9, arXiv: 2308.09471 [hep-ex].

[7] ATLAS Collaboration, *Performance of the reconstruction of large impact parameter tracks in the inner detector of ATLAS*, Eur. Phys. J. C **83** (2023) 1081, arXiv: 2304.12867 [hep-ex].

[8] ATLAS Collaboration, *Expected tracking performance of the ATLAS Inner Tracker at the High-Luminosity LHC*, JINST **20** (2025) P02018, arXiv: 2412.15090 [hep-ex].

[9] ATLAS Collaboration, *Reconstruction of primary vertices at the ATLAS experiment in Run 1 proton–proton collisions at the LHC*, Eur. Phys. J. C **77** (2017) 332, arXiv: 1611.10235 [physics.ins-det].

[10] ATLAS Collaboration, *Vertex Reconstruction Performance of the ATLAS Detector at* $\sqrt{s} = 13$ *TeV*, ATL-PHYS-PUB-2015-026, 2015, URL: https://cds.cern.ch/record/2037717.

[11] ATLAS Collaboration, *Development of ATLAS Primary Vertex Reconstruction for LHC Run 3*, ATL-PHYS-PUB-2019-015, 2019, URL: https://cds.cern.ch/record/2670380.

[12] ATLAS Collaboration, *Alignment of the ATLAS Inner Detector and its Performance in 2012*, ATLAS-CONF-2014-047, 2014, URL: https://cds.cern.ch/record/1741021.

[13] ATLAS Collaboration, *Alignment of the ATLAS Inner Detector with the initial LHC data at* $\sqrt{s} = 13\,TeV$, ATL-PHYS-PUB-2015-031, 2015, URL: https://cds.cern.ch/record/2038139.

[14] ATLAS Collaboration, *Alignment of the ATLAS Inner Detector in Run 2*, Eur. Phys. J. C **80** (2020) 1194, arXiv: 2007.07624 [hep-ex].

[15] ATLAS Collaboration, *Inner Detector alignment development and performance in preparation for Run 3*, ATL-PHYS-PUB-2022-028, 2022, URL: https://cds.cern.ch/record/2811212.

[16] ATLAS Collaboration, *A measurement of material in the ATLAS tracker using secondary hadronic interactions in 7 TeV pp collisions*, JINST **11** (2016) P11020, arXiv: 1609.04305 [hep-ex].

[17] ATLAS Collaboration, *Study of the material of the ATLAS inner detector for Run 2 of the LHC*, JINST **12** (2017) P12009, arXiv: 1707.02826 [hep-ex].

[18] ATLAS Collaboration, *A neural network clustering algorithm for the ATLAS silicon pixel detector*, JINST **9** (2014) P09009, arXiv: 1406.7690 [hep-ex].

[19] ATLAS Collaboration, *Training and validation of the ATLAS pixel clustering neural networks*, ATL-PHYS-PUB-2018-002, 2018, URL: https://cds.cern.ch/record/2309474.

4 Electrons and photons
Last update: 2025-07

The main standard references for electrons and photons reconstruction and identification, and the calibration, in ATLAS are cited below sorted by year/run period.

For Run 3, there are no new measurements or references that can be used, and we suggest to write something along the following line(s) with the citations explained in more detail below:

> Electrons and photons are reconstructed as described in [1]. They are calibrated based on the procedure and results described in [1, 2] with an additional correction on the in-situ scale and resolution corrections that accounts for small differences in the ATLAS reconstruction software and with increased uncertainties to reflect the Run 3 pile-up conditions and a change in optimal filtering coefficients for the LAr calorimeter readout. Electrons are selected using the loose/medium/tight working points with loose/medium/xyz isolation described in [3]. Using the Z boson resonance and the methods described in [3] preliminary data-to-MC correction factors were obtained with uncertainties slightly increased with respect to what is published in [3] for the full Run 2. Photons are selected using the tight working point with loose/medium/xyz isolation described in [1, 3]. Using radiative Z boson events as well as inclusive photons samples a preliminary data-to-MC correction was obtained using the procedures described in [1] with uncertainties slightly increased with respect to what is published in [3] for the full Run 2.

4.1 Electron reconstruction

4.1.1 Run 1

Electron reconstruction+identification (Run1 data sliding window + GSF, 2012 data):
`PERF-2016-01` [4] in `ATLAS.bib`.

4.1.2 Run 2 (rel. 20.7)

Electron reconstruction (2015-2016 data, rel. 20.7 (sliding window)):
`PERF-2017-01` [5] in `ATLAS.bib`.

4.1.3 Run 2 (rel. 21)

Electron reconstruction (Run 2 and Run 3, rel. ≥ 21 (super cluster)):
`EGAM-2018-01` [1] in `ATLAS.bib`.

Electron efficiency (final Run 2 rel. 21, ambient energy correction for isolation):
`EGAM-2021-01` [3] in `ATLAS.bib`.

4.2 Photon reconstruction

4.2.1 Run 1

Photon reconstruction and efficiency (Run 1 data):
`PERF-2013-04` [6] in `ATLAS.bib`.

Ambient Energy Correction to isolation energy:
`STDM-2010-08` [7] in `ATLAS.bib`.

4.2.2 Run 2 (rel. 20.7)

Photon reconstruction and efficiency (2015+2016 data, rel. 20.7 (sliding window cluster)):
`PERF-2017-02` [8] in `ATLAS.bib`.

4.2.3 Run 2 (rel. 21)

Photon reconstruction (Run 2 and Run 3, rel. ≥ 21; super cluster and includes conversions and electron/photon ambiguity resolver descriptions):
`EGAM-2018-01` [1] in `ATLAS.bib`.

Photon efficiency (Final Run 2 rel. 21):
`EGAM-2021-01` [3] in `ATLAS.bib`.

4.3 Electron and photon energy calibration

4.3.1 Run 1

Old calibration scheme and detector geometry (2010 data):
`PERF-2010-04` [9] in `ATLAS.bib`.

New calibration scheme and detector geometry (Run 1 data):
`PERF-2013-05` [10] in `ATLAS.bib`.

4.3.2 Run 2 (rel. 20.7)

Run 2 calibration for rel. 20.7 (Run 2 sliding window cluster):
`PERF-2017-03` [11] in `ATLAS.bib`.

4.3.3 Run 2 (rel. 21)

Run 2 calibration for rel. 21 (`PERF-2017-03` [11] is still relevant, and is quoted in this paper):
`EGAM-2018-01` [1] in `ATLAS.bib`.

Final calibration for Run 2 rel. 21:
`EGAM-2021-02` [2] in `ATLAS.bib`.

References

[1] ATLAS Collaboration, *Electron and photon performance measurements with the ATLAS detector using the 2015–2017 LHC proton–proton collision data*, JINST **14** (2019) P12006, arXiv: 1908.00005 [hep-ex].

[2] ATLAS Collaboration, *Electron and photon energy calibration with the ATLAS detector using LHC Run 2 data*, JINST **19** (2024) P02009, arXiv: 2309.05471 [hep-ex].

[3] ATLAS Collaboration, *Electron and photon efficiencies in LHC Run 2 with the ATLAS experiment*, JHEP **05** (2024) 162, arXiv: 2308.13362 [hep-ex].

[4] ATLAS Collaboration, *Electron efficiency measurements with the ATLAS detector using 2012 LHC proton–proton collision data*, Eur. Phys. J. C **77** (2017) 195, arXiv: 1612.01456 [hep-ex].

[5] ATLAS Collaboration, *Electron reconstruction and identification in the ATLAS experiment using the 2015 and 2016 LHC proton–proton collision data at* $\sqrt{s} = 13$ *TeV*, Eur. Phys. J. C **79** (2019) 639, arXiv: 1902.04655 [physics.ins-det].

[6] ATLAS Collaboration, *Measurement of the photon identification efficiencies with the ATLAS detector using LHC Run-1 data*, Eur. Phys. J. C **76** (2016) 666, arXiv: 1606.01813 [hep-ex].

[7] ATLAS Collaboration, *Measurement of the inclusive isolated prompt photon cross section in* pp *collisions at* $\sqrt{s} = 7$ *TeV with the ATLAS detector*, Phys. Rev. D **83** (2011) 052005, arXiv: 1012.4389 [hep-ex].

[8] ATLAS Collaboration, *Measurement of the photon identification efficiencies with the ATLAS detector using LHC Run 2 data collected in 2015 and 2016*, Eur. Phys. J. C **79** (2019) 205, arXiv: 1810.05087 [hep-ex].

[9] ATLAS Collaboration, *Electron performance measurements with the ATLAS detector using the 2010 LHC proton–proton collision data*, Eur. Phys. J. C **72** (2012) 1909, arXiv: 1110.3174 [hep-ex].

[10] ATLAS Collaboration, *Electron and photon energy calibration with the ATLAS detector using LHC Run 1 data*, Eur. Phys. J. C **74** (2014) 3071, arXiv: 1407.5063 [hep-ex].

[11] ATLAS Collaboration, *Electron and photon energy calibration with the ATLAS detector using 2015–2016 LHC proton–proton collision data*, JINST **14** (2019) P03017, arXiv: 1812.03848 [hep-ex].

5 Muons
Last update: 2025-07-26

A list of references can be found here: https://atlas-mcp.docs.cern.ch/publications/index.html.

5.1 Muon identification

5.1.1 Run 2

MUON-2018-03 [1] in ATLAS.bib.

5.2 Muon reconstruction

5.2.1 2015 data

PERF-2015-10 [2] in ATLAS.bib.

5.2.2 2011 and 2012 data

PERF-2014-05 [3] in ATLAS.bib.

5.2.3 2010 data

PERF-2011-01 [4] in ATLAS.bib.

5.3 Muon calibration

5.3.1 Run 2

MUON-2022-01 [5] in ATLAS.bib.

References

[1] ATLAS Collaboration, *Muon reconstruction and identification efficiency in ATLAS using the full Run 2 pp collision data set at $\sqrt{s}$ = 13 TeV*, Eur. Phys. J. C **81** (2021) 578, arXiv: 2012.00578 [hep-ex].

[2] ATLAS Collaboration, *Muon reconstruction performance of the ATLAS detector in proton–proton collision data at $\sqrt{s}$ = 13 TeV*, Eur. Phys. J. C **76** (2016) 292, arXiv: 1603.05598 [hep-ex].

[3] ATLAS Collaboration, *Measurement of the muon reconstruction performance of the ATLAS detector using 2011 and 2012 LHC proton–proton collision data*, Eur. Phys. J. C **74** (2014) 3130, arXiv: 1407.3935 [hep-ex].

[4] ATLAS Collaboration, *Muon reconstruction efficiency and momentum resolution of the ATLAS experiment in proton–proton collisions at $\sqrt{s}$ = 7 TeV in 2010*, Eur. Phys. J. C **74** (2014) 3034, arXiv: 1404.4562 [hep-ex].

[5] ATLAS Collaboration, *Studies of the muon momentum calibration and performance of the ATLAS detector with pp collisions at $\sqrt{s}$ = 13 TeV*, Eur. Phys. J. C **83** (2023) 686, arXiv: 2212.07338 [hep-ex].

6 Isolation and fake leptons

Last update: no information

EGAM-2019-01 [1] in ATLAS.bib.

References

[1] ATLAS Collaboration,
Tools for estimating fake/non-prompt lepton backgrounds with the ATLAS detector at the LHC,
JINST **18** (2023) T11004, arXiv: 2211.16178 [hep-ex].

7 Jets
Last update: 2025-05-13

All Jet/Etmiss publications can be found here: https://twiki.cern.ch/twiki/bin/view/AtlasPublic/JetEtmissPublicResults. Only recent, Run 2 or Run 3 related recommendations are listed below. Some techniques were documented in Run 1 publications, which we leave here for reference.

7.1 Jet reconstruction

Note: see below for references to jet algorithms and theory references.

7.1.1 Topological clusters

PERF-2014-07 [1] in ATLAS.bib.

7.1.2 Particle flow

PERF-2015-09 [2] in ATLAS.bib.

7.1.3 UFO jets

JETM-2018-06 [3] in ATLAS.bib.

7.1.4 Cell timing cut in topo-cluster reconstruction

Run 3 analyses only:
JETM-2023-01 [4] in ATLAS.bib.

7.2 Jet energy scale and resolution

7.2.1 Run 1 pile-up mitigation techniques

PERF-2014-03 [5] in ATLAS.bib.

7.2.2 Consolidated Run 2 JES/JER (2015-2017 data)

Current reference for Run 2 papers:
`JETM-2018-05` [6] in `ATLAS.bib`.

7.2.3 Run 2 large-radius in situ calibration

Current reference for large-R JES/JMS calibration:
`JETM-2018-02` [7] in `ATLAS.bib`.

7.2.4 Run 2 Large-radius JMS/JMR in situ calibration

Current reference for large-R JMS/JMR calibration:
`ATLAS-CONF-2020-022` [8] in `ConfNotes.bib`.

7.3 Jet pile-up suppression (JVT, fJVT)

7.3.1 JVT / NNJVT

This is Run 1 JVT paper to be cited for both, Run 2 NNJVT paper is planned for early 2026:
`PERF-2014-03` [5] in `ATLAS.bib`.

7.3.2 fJVT for EMTopo jets

`PERF-2016-06` [9] in `ATLAS.bib`.

7.3.3 fJVT for PFlow jets

`ATL-PHYS-PUB-2019-026` [10] in `PubNotes.bib`.

7.4 Jet substructure and tagging performance

7.4.1 Run 2 *W*/top tagging performance

Default reference for tagging in Run 2:
`JETM-2018-03` [11] in `ATLAS.bib`.

7.4.2 Run 2 *W*/top tagging scale factors

Default reference for uncertainties + latest taggers in Run 2, use together with `JETM-2018-03` [11]:
`ATL-PHYS-PUB-2020-017` [12] in `PubNotes.bib`.

7.4.3 Run 2 *W*/*Z* tagging scale factors for TCC jets

`ATL-PHYS-PUB-2020-008` [13] in `PubNotes.bib`.

7.4.4 Run 2 Higgs tagging

Please see FTAG recommendations for updates/calibration.
`PERF-2017-04` [14] in `ATLAS.bib`.

7.4.5 Top tagging with UFO jets

`ATL-PHYS-PUB-2021-028` [15] in `PubNotes.bib`.

7.4.6 *W*/*Z* tagging with UFO jets

`ATL-PHYS-PUB-2021-029` [16] in `PubNotes.bib`.

7.4.7 Performance of quark/gluon tagging in rel. 21

`JETM-2020-02` [17] in `ATLAS.bib`.

7.5 Jet algorithms

Make sure to cite FastJet in addition to the jet clustering algorithm to abide by the licensing agreement.

Anti-k_t algorithm
`Cacciari:2008gp` [18] in `ATLAS-useful.bib`.

Fastjet
`Fastjet` [19] in `ATLAS-useful.bib`.

References

[1] ATLAS Collaboration,
Topological cell clustering in the ATLAS calorimeters and its performance in LHC Run 1,
Eur. Phys. J. C **77** (2017) 490, arXiv: 1603.02934 [hep-ex].

[2] ATLAS Collaboration,
Jet reconstruction and performance using particle flow with the ATLAS Detector,
Eur. Phys. J. C **77** (2017) 466, arXiv: 1703.10485 [hep-ex].

[3] ATLAS Collaboration, *Optimisation of large-radius jet reconstruction for the ATLAS detector in* 13 *TeV proton–proton collisions*, Eur. Phys. J. C **81** (2021) 334, arXiv: 2009.04986 [hep-ex].

[4] ATLAS Collaboration,
Improving topological cluster reconstruction using calorimeter cell timing in ATLAS,
Eur. Phys. J. C **84** (2024) 455, arXiv: 2310.16497 [physics.ins-det].

[5] ATLAS Collaboration, *Performance of pile-up mitigation techniques for jets in pp collisions at $\sqrt{s} = 8$ TeV using the ATLAS detector*, Eur. Phys. J. C **76** (2016) 581,
arXiv: 1510.03823 [hep-ex].

[6] ATLAS Collaboration, *Jet energy scale and resolution measured in proton–proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*, Eur. Phys. J. C **81** (2021) 689,
arXiv: 2007.02645 [hep-ex].

[7] ATLAS Collaboration, *In situ calibration of large-radius jet energy and mass in* 13 *TeV proton–proton collisions with the ATLAS detector*, Eur. Phys. J. C **79** (2019) 135,
arXiv: 1807.09477 [hep-ex].

[8] ATLAS Collaboration, *Measurement of the ATLAS Detector Jet Mass Response using Forward Folding with* $80\,fb^{-1}$ *of* $\sqrt{s} = 13$ *TeV pp data*, ATLAS-CONF-2020-022, 2020,
URL: https://cds.cern.ch/record/2724442.

[9] ATLAS Collaboration,
Identification and rejection of pile-up jets at high pseudorapidity with the ATLAS detector,
Eur. Phys. J. C **77** (2017) 580, arXiv: 1705.02211 [hep-ex],
Erratum: Eur. Phys. J. C **77** (2017) 712.

[10] ATLAS Collaboration, *Forward jet vertex tagging using the particle flow algorithm*,
ATL-PHYS-PUB-2019-026, 2019, URL: https://cds.cern.ch/record/2683100.

[11] ATLAS Collaboration,
Performance of top-quark and W-boson tagging with ATLAS in Run 2 of the LHC,
Eur. Phys. J. C **79** (2019) 375, arXiv: 1808.07858 [hep-ex].

[12] ATLAS Collaboration,
Boosted hadronic vector boson and top quark tagging with ATLAS using Run 2 data,
ATL-PHYS-PUB-2020-017, 2020, URL: https://cds.cern.ch/record/2724149.

[13] ATLAS Collaboration, *A W/Z-boson tagger using Track-CaloCluster jets with ATLAS*,
ATL-PHYS-PUB-2020-008, 2020, URL: https://cds.cern.ch/record/2718218.

[14] ATLAS Collaboration, *Identification of boosted Higgs bosons decaying into b-quark pairs with the ATLAS detector at* 13 *TeV*, Eur. Phys. J. C **79** (2019) 836, arXiv: 1906.11005 [hep-ex].

[15] ATLAS Collaboration,
Identification of hadronically-decaying top quarks using UFO jets with ATLAS in Run 2,
ATL-PHYS-PUB-2021-028, 2021, URL: https://cds.cern.ch/record/2776782.

[16] ATLAS Collaboration, *Performance of W/Z taggers using UFO jets in ATLAS*,
ATL-PHYS-PUB-2021-029, 2021, URL: https://cds.cern.ch/record/2777009.

[17] ATLAS Collaboration, *Performance and calibration of quark/gluon-jet taggers using* $140\,fb^{-1}$ *of* pp *collisions at* $\sqrt{s} = 13$ *TeV with the ATLAS detector*, Chin. Phys. C **48** (2024) 023001,
arXiv: 2308.00716 [hep-ex].

[18] M. Cacciari, G. P. Salam and G. Soyez, *The anti-k_t jet clustering algorithm*, JHEP **04** (2008) 063,
arXiv: 0802.1189 [hep-ph].

[19] M. Cacciari, G. P. Salam and G. Soyez, *FastJet user manual*, Eur. Phys. J. C **72** (2012) 1896,
arXiv: 1111.6097 [hep-ph].

8 Missing transverse momentum
Last update: 2025-05-13

8.1 $E_{\mathrm{T}}^{\mathrm{miss}}$ performance in Run 2

Reference for Run2 papers:
`JETM-2020-03` [1] in `ATLAS.bib`.

8.2 $E_{\mathrm{T}}^{\mathrm{miss}}$ significance in Run 2

`ATLAS-CONF-2018-038` [2] in `ConfNotes.bib`.

References

[1] ATLAS Collaboration, *The performance of missing transverse momentum reconstruction and its significance with the ATLAS detector using* $140\,fb^{-1}$ *of* $\sqrt{s} = 13\,TeV$ pp *collisions*, Eur. Phys. J. C **85** (2025) 606, arXiv: 2402.05858 [hep-ex].

[2] ATLAS Collaboration, *Object-based missing transverse momentum significance in the ATLAS Detector*, ATLAS-CONF-2018-038, 2018, URL: https://cds.cern.ch/record/2630948.

9 Flavour tagging

Last update: no information

Release 25: atlas-talk
Legacy: BTaggingPaperRecommendations.

10 Taus

Last update: 2025-07-23

10.1 Fake tau background estimation

TAUP-2023-01 [1] in ATLAS.bib.

10.2 Tau reconstruction and identification

muonRM taus, both in Run 2 and Run 3:
TAUP-2023-02 [2] in ATLAS.bib.

Boosted-ditau, both Run 2 and Run 3:
TAUP-2020-03 [3] in ATLAS.bib. HDBS-2019-22 [4] in ATLAS.bib.

10.3 Tau identification algorithms (tauID)

For Run 2, rel. 22 (reprocessed data) and Run 3 analyses using tau-leptons:
ATL-PHYS-PUB-2022-044 [5] in PubNotes.bib.

For Run 2 analyses (rel. 21) using the RNN TauID algorithm:
ATL-PHYS-PUB-2019-033 [6] in PubNotes.bib.

For Run 2 analyses (rel. 21), the performance of the tauID algorithms and recommendations are described on the TWiki page: TauWG.

The Run 1 paper (listed below) can still be referenced in addition for a more detailed description of the algorithms and of performance of the tau energy calibration. ATLAS-CONF-2017-029 [7] in ConfNotes.bib.

A public document is available, summarising the tauID algorithms, and pre-recommendations. It should be used for any result using the Run 2 pre-recommendations:
ATL-PHYS-PUB-2015-045 [8] in PubNotes.bib.

10.4 Run 1 tau performance

The Run 1 tau performance paper is the sole reference required for offline and online tau performance in Run 1. The article covers reconstruction, energy calibration and identification plus the associated performance measurements.
`PERF-2013-06` [9] in `ATLAS.bib`.

References

[1] ATLAS Collaboration, *Estimation of backgrounds from jets misidentified as τ-leptons using the Universal Fake Factor method with the ATLAS detector*, Eur. Phys. J. C **85** (2025) 1441, arXiv: 2502.04156 [hep-ex].

[2] ATLAS Collaboration, *Improved reconstruction of highly boosted τ-lepton pairs in the $\tau\tau \to (\mu\nu_\mu\nu_\tau)(\text{hadrons} + \nu_\tau)$ decay channels with the ATLAS detector*, Eur. Phys. J. C **85** (2025) 706, arXiv: 2412.14937 [hep-ex].

[3] ATLAS Collaboration, *Reconstruction and identification of pairs of collimated τ-leptons decaying hadronically using $\sqrt{s} = 13$ TeV pp collision data with the ATLAS detector*, Eur. Phys. J. C **85** (2025) 561, arXiv: 2411.09357 [hep-ex].

[4] ATLAS Collaboration, *Reconstruction and identification of boosted di-τ systems in a search for Higgs boson pairs using 13 TeV proton–proton collision data in ATLAS*, JHEP **11** (2020) 163, arXiv: 2007.14811 [hep-ex].

[5] ATLAS Collaboration, *Reconstruction, Identification, and Calibration of hadronically decaying tau leptons with the ATLAS detector for the LHC Run 3 and reprocessed Run 2 data*, ATL-PHYS-PUB-2022-044, 2022, URL: https://cds.cern.ch/record/2827111.

[6] ATLAS Collaboration, *Identification of hadronic tau lepton decays using neural networks in the ATLAS experiment*, ATL-PHYS-PUB-2019-033, 2019, URL: https://cds.cern.ch/record/2688062.

[7] ATLAS Collaboration, *Measurement of the tau lepton reconstruction and identification performance in the ATLAS experiment using pp collisions at $\sqrt{s} = 13$ TeV*, ATLAS-CONF-2017-029, 2017, URL: https://cds.cern.ch/record/2261772.

[8] ATLAS Collaboration, *Reconstruction, Energy Calibration, and Identification of Hadronically Decaying Tau Leptons in the ATLAS Experiment for Run-2 of the LHC*, ATL-PHYS-PUB-2015-045, 2015, URL: https://cds.cern.ch/record/2064383.

[9] ATLAS Collaboration, *Identification and energy calibration of hadronically decaying tau leptons with the ATLAS experiment in pp collisions at $\sqrt{s} = 8$ TeV*, Eur. Phys. J. C **75** (2015) 303, arXiv: 1412.7086 [hep-ex].

11 Trigger
Last update: no information

A list of all references can be found here: TriggerPublicResults.

Key publications are listed below.

11.1 Trigger system publications

If the paper uses any combination of Run 1, Run 2 and Run 3 data, please cite all applicable papers below.

11.1.1 Run 1 data only

Performance of the ATLAS Trigger System in 2010
`TRIG-2011-02` [1] in `ATLAS.bib`.

11.1.2 Run 2 data only

Performance of the ATLAS Trigger system in 2015:
`TRIG-2016-01` [2] in `ATLAS.bib`.

11.1.3 Run 3 data only

The ATLAS Trigger System for LHC Run 3 and Trigger performance in 2022:
`TRIG-2022-01` [3] in `ATLAS.bib`.

11.2 Trigger signature publications

In addition, please cite all of the relevant signature publications for the specific triggers you've used:

11.2.1 Run 3 data

b-jet triggers: Optimization and Commissioning of the *b*-jet triggers for LHC Run 3:
`TRIG-2022-02` [4] in `ATLAS.bib`.

Multi-b-jet triggers: Fast b-tagging at the high-level trigger of the ATLAS experiment in LHC Run 3:
`TRIG-2022-03` [5] in `ATLAS.bib`.

11.2.2 Run 2 data

Electron / Photon triggers: Performance of the electron and photon triggers of the ATLAS experiment during LHC Run 2
`TRIG-2018-05` [6] in `ATLAS.bib`.

Muon triggers: Performance of the ATLAS muon triggers in Run 2
`TRIG-2018-01` [7] in `ATLAS.bib`.

Missing ET triggers: Performance of the missing transverse momentum triggers for the ATLAS detector during Run 2 data taking `TRIG-2019-01` [8] in `ATLAS.bib`.

b-jet triggers: Performance of the ATLAS *b*-jet trigger in *pp* collisions at $\sqrt{s} = 13$ TeV
`TRIG-2018-08` [9] in `ATLAS.bib`.

L1Topo triggers: Performance of the ATLAS Level-1 topological trigger in Run 2
`TRIG-2019-02` [10] in `ATLAS.bib`.

For any other signatures, please refer to the previous publications, e.g. for jets you can use the 2011 paper for the description of the FS jet finding.

Unless all your triggers are pure calorimeter triggers, please also cite
Inner Detector based triggers: The ATLAS Inner Detector Trigger performance in *pp* collisions at 13 TeV during LHC Run 2:
`TRIG-2019-03` [11] in `ATLAS.bib`.

In case you discuss operational matters of the Run 2 trigger system, please cite this paper:

Operation of the ATLAS trigger system in Run 2:
`TRIG-2019-02` [10] in `ATLAS.bib`.

References

[1] ATLAS Collaboration, *Performance of the ATLAS Trigger System in 2010*, Eur. Phys. J. C **72** (2012) 1849, arXiv: 1110.1530 [hep-ex].

[2] ATLAS Collaboration, *Performance of the ATLAS trigger system in 2015*, Eur. Phys. J. C **77** (2017) 317, arXiv: 1611.09661 [hep-ex].

[3] ATLAS Collaboration, *The ATLAS trigger system for LHC Run 3 and trigger performance in 2022*, JINST **19** (2024) P06029, arXiv: 2401.06630 [hep-ex].

[4] ATLAS Collaboration, *Configuration, Performance, and Commissioning of the ATLAS b-jet Triggers for the 2022 and 2023 LHC data-taking periods*, JINST **20** (2025) P03002, arXiv: 2501.11420 [hep-ex].

[5] ATLAS Collaboration, *Fast b-tagging at the high-level trigger of the ATLAS experiment in LHC Run 3*, JINST **18** (2023) P11006, arXiv: 2306.09738 [hep-ex].

[6] ATLAS Collaboration, *Performance of electron and photon triggers in ATLAS during LHC Run 2*, Eur. Phys. J. C **80** (2020) 47, arXiv: 1909.00761 [hep-ex].

[7] ATLAS Collaboration, *Performance of the ATLAS muon triggers in Run 2*, JINST **15** (2020) P09015, arXiv: 2004.13447 [physics.ins-det].

[8] ATLAS Collaboration, *Performance of the missing transverse momentum triggers for the ATLAS detector during Run-2 data taking*, JHEP **08** (2020) 080, arXiv: 2005.09554 [hep-ex].

[9] ATLAS Collaboration, *Configuration and performance of the ATLAS b-jet triggers in Run 2*, Eur. Phys. J. C **81** (2021) 1087, arXiv: 2106.03584 [hep-ex].

[10] ATLAS Collaboration, *Performance of the ATLAS Level-1 topological trigger in Run 2*, Eur. Phys. J. C **82** (2022) 7, arXiv: 2105.01416 [hep-ex].

[11] ATLAS Collaboration, *The ATLAS inner detector trigger performance in pp collisions at* 13 *TeV during LHC Run 2*, Eur. Phys. J. C **82** (2022) 206, arXiv: 2107.02485 [hep-ex].

12 PDFS

Last update: no information

12.1 PDF4LHC recommendations

`Butterworth:2015oua` [1] in `ATLAS-useful.bib`.

12.2 CTEQ5

`Lai:1999wy` [2] in `ATLAS-useful.bib`.

12.3 CTEQ6

`Pumplin:2002vw` [3] in `ATLAS-useful.bib`.

References

[1] J. Butterworth et al., *PDF4LHC recommendations for LHC Run II*, J. Phys. G **43** (2016) 023001, arXiv: 1510.03865 [hep-ph].

[2] H. L. Lai et al.,
Global QCD analysis of parton structure of the nucleon: CTEQ5 parton distributions,
Eur. Phys. J. C **12** (2000) 375, arXiv: hep-ph/9903282.

[3] J. Pumplin et al.,
New Generation of Parton Distributions with Uncertainties from Global QCD Analysis,
JHEP **07** (2002) 012, arXiv: hep-ph/0201195.

13 Simulation
Last update: no information

13.1 Monte Carlo generators

Check the following document by PMG (shipped with the `atlaslatex` package) that contains references for many samples:
https://gitlab.cern.ch/atlas-physics-office/atlaslatex/-/tree/master/template/MC_snippets.

13.2 Simulation tools

13.2.1 GEANT4

`Agostinelli:2002hh` [1] in `ATLAS-useful.bib`.

Note that the following paper describes the full and all the flavoUrs of fast simulation; it can be used as a reference for both the ATLAS detector simulation and for Atlfast-II, for example:
`SOFT-2010-01` [2] in `ATLAS.bib`.

If you wish to discuss the details of hadronic physics lists in Geant4, please cite:
`Geant4PhysicsLists` [3] in `ATLAS-useful.bib`.

References

[1] S. Agostinelli et al., *GEANT4 – a simulation toolkit*, Nucl. Instrum. Meth. A **506** (2003) 250.

[2] ATLAS Collaboration, *The ATLAS Simulation Infrastructure*, Eur. Phys. J. C **70** (2010) 823, arXiv: 1005.4568 [physics.ins-det].

[3] A. Ribon et al., *Status of Geant4 hadronic physics for the simulation of LHC experiments at the start of the LHC physics program*, (2010).

14 Statistical analysis
Last update: no information

14.1 Neyman-Pearson lemma

Neyman:1933wgr [1] in ATLAS-useful.bib.

14.2 CL_s method

Junk:1999kv [2] in ATLAS-useful.bib.

Read:2002hq [3] in ATLAS-useful.bib.

14.3 Profile likelihood method

Rolke:2004mj [4] in ATLAS-useful.bib.

14.4 Asymptotic formulae and profile likelihood

Cowan:2010js [5] from ATLAS-useful.bib.

14.5 RooFit

RooFit [6] from ATLAS-useful.bib.

14.6 RooUnfold

Adye:2011gm [7] from ATLAS-useful.bib.

14.7 TMVA

TMVA [8] from ATLAS-useful.bib.

14.8 Keras

chollet2015keras [9] from ATLAS-useful.bib.

14.9 HistFitter

Baak:2014wma [10] in ATLAS-useful.bib.

14.10 BLUE

When using the BLUE method, please cite at least
Lyons:1988rp [11] in ATLAS-useful.bib.

If the method involves multiple observables, please cite in addition
2003NIMPA.500..391V [12] in ATLAS-useful.bib.

The following two citations can also be added, especially if the iterative version of BLUE is used: DAGOSTINI1994306 [13] in ATLAS-useful.bib

and

Blobel:2003wa [14] in ATLAS-useful.bib.

Finally, if the blue.hepforge.org implementation is used, please cite:
Nisius:2020jmf [15] and Nisius:2014wua [16] in ATLAS-useful.bib.

References

[1] J. Neyman and E. S. Pearson, *On the Problem of the Most Efficient Tests of Statistical Hypotheses*, Phil. Trans. Roy. Soc. Lond. A **231** (1933) 289.

[2] T. Junk, *Confidence level computation for combining searches with small statistics*, Nucl. Instrum. Meth. A **434** (1999) 435, arXiv: hep-ex/9902006.

[3] A. L. Read, *Presentation of search results: the CL_s technique*, J. Phys. G **28** (2002) 2693.

[4] W. A. Rolke, A. M. López and J. Conrad, *Limits and confidence intervals in the presence of nuisance parameters*, Nucl. Instrum. Meth. A **551** (2005) 493, ed. by L. Lyons and M. Karagoz, arXiv: physics/0403059.

[5] G. Cowan, K. Cranmer, E. Gross and O. Vitells, *Asymptotic formulae for likelihood-based tests of new physics*, Eur. Phys. J. C **71** (2011) 1554, arXiv: 1007.1727 [physics.data-an], Erratum: Eur. Phys. J. C **73** (2013) 2501.

[6] W. Verkerke and D. Kirkby, *The RooFit toolkit for data modeling*, 2003, arXiv: physics/0306116 [physics.data-an].

[7] T. Adye, 'Unfolding algorithms and tests using RooUnfold',
Proceedings, 2011 Workshop on Statistical Issues Related to Discovery Claims in Search Experiments and Unfolding (PHYSTAT 2011) (CERN, Geneva, Switzerland, 17th–20th Jan. 2011) 313, arXiv: 1105.1160 [physics.data-an].

[8] A. Hoecker et al., *TMVA - Toolkit for Multivariate Data Analysis*, 2009,
arXiv: physics/0703039 [physics.data-an].

[9] F. Chollet et al., *Keras*, 2015, URL: https://keras.io.

[10] M. Baak et al., *HistFitter software framework for statistical data analysis*,
Eur. Phys. J. **C75** (2015) 153, arXiv: 1410.1280 [hep-ex].

[11] L. Lyons, D. Gibaut and P. Clifford,
How to Combine Correlated Estimates of a Single Physical Quantity,
Nucl. Instrum. Meth. **A270** (1988) 110.

[12] A. Valassi, *Combining correlated measurements of several different physical quantities*,
Nuclear Instruments and Methods in Physics Research A **500** (2003) 391.

[13] G. D'Agostini, *On the use of the covariance matrix to fit correlated data*,
Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment **346** (1994) 306, ISSN: 0168-9002.

[14] V. Blobel, *Some Comments on χ^2 Minimization Applications*,
eConf **C030908** (2003) MOET002, ed. by L. Lyons, R. P. Mount and R. Reitmeyer,
URL: https://www.slac.stanford.edu/econf/C030908/.

[15] R. Nisius, *BLUE: Combining correlated estimates of physics observables within ROOT using the Best Linear Unbiased Estimate method*, SoftwareX **11** (2020) 100468,
arXiv: 2001.10310 [physics.data-an].

[16] R. Nisius, *On the combination of correlated estimates of a physics observable*,
Eur. Phys. J. C **74** (2014) 3004, arXiv: 1402.4016 [physics.data-an].

15 Physics processes and cross sections
Last update: no information

15.1 Higgs

The recommended list of Higgs theory papers to be used for ATLAS Higgs papers can be found at: HiggsCrossSection.

15.2 SUSY

A set of standard SUSY references can be found at:
StandardSUSYRefs.

15.3 Top-quark pairs

A list of references for top-quark pair production can be be found at:
https://twiki.cern.ch/twiki/bin/view/LHCPhysics/TtbarNNLO#Proposed_citation_and_list_of_re.

The page includes useful numbers and parameterisations of the cross section. The content of the page was agreed on by ATLAS and CMS.

15.4 Physics modelling group

A list of references and text snippets for MC generators are provided by the physics modelling group and can be found in the atlaslatex MC snippets

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