

# Rapport d'activité LPNHE 2024–2025

## Liste de publications du pôle “Masses et Interactions Fondamentales”

1. ATLAS Collaboration. « Differential cross-section measurements of coherent production of singly and doubly resonant top-quark in  $WWbb$  events with one lepton at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (oct. 2025). arXiv : [2510.26476 \[hep-ex\]](#)
2. ATLAS Collaboration. « Measurement of the Higgs boson production in association with top quarks in multilepton final states in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (oct. 2025). arXiv : [2510.23755 \[hep-ex\]](#)
3. ATLAS Collaboration. « Search for emerging jets in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS experiment ». *arXiv e-prints* (oct. 2025). arXiv : [2510.12347 \[hep-ex\]](#)
4. ATLAS Collaboration. « Search for a resonance decaying into a scalar particle and a Higgs boson in the final state with two bottom quarks and two photons with  $199 \text{ fb}^{-1}$  of data collected at  $\sqrt{s}=13$  TeV and  $\sqrt{s}=13.6$  TeV with the ATLAS detector ». *arXiv e-prints* (oct. 2025). arXiv : [2510.02857 \[hep-ex\]](#)
5. ATLAS Collaboration. « A search for electroweak  $t\bar{t}Wj$  production in multileptonic final states at  $\sqrt{s} = 13$  TeV with the ATLAS detector and bounds on effective field theory operators ». *arXiv e-prints* (sept. 2025). arXiv : [2509.19038 \[hep-ex\]](#)
6. ATLAS Collaboration. « Measurement of the top-quark Yukawa coupling from  $t\bar{t}$  production in the lepton+jets final state using  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (sept. 2025). arXiv : [2509.16039 \[hep-ex\]](#)
7. ATLAS Collaboration. « Precise measurement of the  $t\bar{t}$  production cross-section and lepton differential distributions in  $e\mu$  dilepton events from  $\sqrt{s} = 13$  TeV  $pp$  collisions with the ATLAS detector ». *arXiv e-prints* (sept. 2025). arXiv : [2509.15066 \[hep-ex\]](#)
8. ATLAS Collaboration. « Observation of  $W^+W^-\gamma$  production in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector and constraints on anomalous quartic gauge-boson couplings ». *arXiv e-prints* (sept. 2025). arXiv : [2509.14070 \[hep-ex\]](#)
9. The ATLAS Collaboration. « Measurement of the  $W$ -boson angular coefficients and transverse momentum in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (sept. 2025). arXiv : [2509.13759 \[hep-ex\]](#)
10. ATLAS Collaboration. « Observation of structures in the  $J/\psi + \psi(2S)$  mass spectrum with the ATLAS detector ». *arXiv e-prints* (sept. 2025). arXiv : [2509.13101 \[hep-ex\]](#)

11. ATLAS Collaboration. « Measurement of the azimuthal anisotropy of charged particles in  $\sqrt{s_{\text{NN}}} = 5.36$  TeV  $^{16}\text{O}+^{16}\text{O}$  and  $^{20}\text{Ne}+^{20}\text{Ne}$  collisions with the ATLAS detector ». *arXiv e-prints* (sept. 2025). arXiv : [2509.05171 \[nucl-ex\]](#)
12. ATLAS Collaboration. « Measurement of coherent exclusive  $J/\psi \rightarrow \mu^+\mu^-$  production in ultraperipheral Pb+Pb collisions at  $\sqrt{s_{\text{NN}}} = 5.36$  TeV with the ATLAS detector ». *arXiv e-prints* (sept. 2025). arXiv : [2509.04135 \[nucl-ex\]](#)
13. G. Aad, E. Aakvaag, B. Abbott et al. « Search for electroweak-scale dijet resonances using trigger-level analysis with the ATLAS detector in 132 fb<sup>-1</sup> of pp collisions at s=13 TeV ». *Phys. Rev. D* 112.9, 092015 (nov. 2025), p. 092015. DOI : [10.1103/15p2-bkg8](#). arXiv : [2509.01219 \[hep-ex\]](#)
14. ATLAS Collaboration. « Search for heavy neutral leptons in decays of W bosons produced in 13 TeV pp collisions using prompt signatures in the ATLAS detector ». *arXiv e-prints* (août 2025). arXiv : [2508.20929 \[hep-ex\]](#)
15. ATLAS Collaboration. « Search for Beyond the Standard Model physics with anomaly detection in multilepton final states in pp collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (août 2025). arXiv : [2508.19778 \[hep-ex\]](#)
16. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Search for the production of a Higgs boson in association with a single top quark in pp collisions at s=13 TeV with the ATLAS detector ». *Journal of High Energy Physics* 2025.10, 93 (oct. 2025), p. 93. DOI : [10.1007/JHEP10\(2025\)093](#). arXiv : [2508.14695 \[hep-ex\]](#)
17. ATLAS Collaboration. « Search for the Higgs boson decay to a Z boson and a photon in pp collisions at  $\sqrt{s} = 13$  TeV and 13.6 TeV with the ATLAS detector ». *arXiv e-prints* (juill. 2025). arXiv : [2507.12598 \[hep-ex\]](#)
18. ATLAS Collaboration. « Evidence for the dimuon decay of the Higgs boson in pp collisions with the ATLAS detector ». *arXiv e-prints* (juill. 2025). arXiv : [2507.03595 \[hep-ex\]](#)
19. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Measurements and interpretations of  $W^{\pm}Z$  production cross-sections in pp collisions at s=13 TeV with the ATLAS detector ». *Journal of High Energy Physics* 2025.11, 6 (nov. 2025), p. 6. DOI : [10.1007/JHEP11\(2025\)006](#). arXiv : [2507.03500 \[hep-ex\]](#)
20. ATLAS Collaboration. « Study of Higgs boson pair production in the  $HH \rightarrow b\bar{b}\gamma\gamma$  final state with 308 fb<sup>-1</sup> of data collected at  $\sqrt{s} = 13$  TeV and 13.6 TeV by the ATLAS experiment ». *arXiv e-prints* (juill. 2025). arXiv : [2507.03495 \[hep-ex\]](#)
21. ATLAS Collaboration. « Measurement of the top-quark pole mass in dileptonic  $t\bar{t} + 1$ -jet events at  $\sqrt{s} = 13$  TeV with the ATLAS experiment ». *arXiv e-prints* (juill. 2025). arXiv : [2507.02632 \[hep-ex\]](#)
22. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « A search for dark matter produced in association with a dark Higgs boson decaying into a Higgs boson pair in 3b or 4b final states using pp collisions at s=13 TeV with the ATLAS detector ». *Journal of High Energy Physics* 2025.9, 67 (sept. 2025), p. 67. DOI : [10.1007/JHEP09\(2025\)067](#). arXiv : [2507.02175 \[hep-ex\]](#)

23. G. Aad, E. Aakvaag, B. Abbott et al. « Search for decays of the Higgs boson into scalar particles decaying into four or six b quarks using  $pp$  collisions at  $\sqrt{s}=13$  TeV with the ATLAS detector ». *Phys. Rev. D* 112.7, 072005 (oct. 2025), p. 072005. DOI : [10.1103/mz1d-1d1t](https://doi.org/10.1103/mz1d-1d1t). arXiv : [2507.01165](https://arxiv.org/abs/2507.01165) [hep-ex]
24. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Probing the Higgs boson CP properties in vector-boson fusion production in the  $H \rightarrow \tau^+\tau^-$  channel with the ATLAS detector ». *Journal of High Energy Physics* 2025.10, 92 (oct. 2025), p. 92. DOI : [10.1007/JHEP10\(2025\)092](https://doi.org/10.1007/JHEP10(2025)092). arXiv : [2506.19395](https://arxiv.org/abs/2506.19395) [hep-ex]
25. ATLAS Collaboration. « Search for single production of vector-like quarks decaying into  $W(\ell\nu)b$  in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (juin 2025). arXiv : [2506.15515](https://arxiv.org/abs/2506.15515) [hep-ex]
26. ATLAS Collaboration. « An implementation of neural simulation-based inference for parameter estimation in ATLAS ». *Reports on Progress in Physics* 88.6, 067801 (juin 2025), p. 067801. DOI : [10.1088/1361-6633/add370](https://doi.org/10.1088/1361-6633/add370). arXiv : [2412.01600](https://arxiv.org/abs/2412.01600) [physics.data-an]
27. ATLAS Collaboration. « Transforming jet flavour tagging at ATLAS ». *arXiv e-prints* (mai 2025). arXiv : [2505.19689](https://arxiv.org/abs/2505.19689) [hep-ex]
28. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « A continuous calibration of the ATLAS flavour-tagging classifiers via optimal transportation maps ». *European Physical Journal C* 85.11, 1272 (nov. 2025), p. 1272. DOI : [10.1140/epjc/s10052-025-14682-0](https://doi.org/10.1140/epjc/s10052-025-14682-0). arXiv : [2505.13063](https://arxiv.org/abs/2505.13063) [hep-ex]
29. ATLAS Collaboration, G. Aad, B. Abbott et al. « Measurements of  $W^+W^-$  production cross-sections in  $pp$  collisions at  $s=13$  TeV with the ATLAS detector ». *Journal of High Energy Physics* 2025.8, 142 (août 2025), p. 142. DOI : [10.1007/JHEP08\(2025\)142](https://doi.org/10.1007/JHEP08(2025)142). arXiv : [2505.11310](https://arxiv.org/abs/2505.11310) [hep-ex]
30. ATLAS Collaboration. « The environmental impact, carbon emissions and sustainability of computing in the ATLAS experiment ». *arXiv e-prints* (mai 2025). arXiv : [2505.08530](https://arxiv.org/abs/2505.08530) [hep-ex]
31. G. Aad, E. Aakvaag, B. Abbott et al. « Observation of double parton scattering in same-sign  $W$  boson pair production in  $pp$  collisions at  $\sqrt{s}=13$  TeV with the ATLAS detector ». *Physics Letters B* 870, 139892 (nov. 2025), p. 139892. DOI : [10.1016/j.physletb.2025.139892](https://doi.org/10.1016/j.physletb.2025.139892). arXiv : [2505.08313](https://arxiv.org/abs/2505.08313) [hep-ex]
32. ATLAS Collaboration. « Search for emerging jets in  $pp$  collisions at  $\sqrt{s}=13.6$  TeV with the ATLAS experiment ». *Reports on Progress in Physics* 88.9, 097801 (sept. 2025), p. 097801. DOI : [10.1088/1361-6633/adfe17](https://doi.org/10.1088/1361-6633/adfe17)
33. G. Aad, E. Aakvaag, B. Abbott et al. « Search for new physics in final states with semivisible jets or anomalous signatures using the ATLAS detector ». *Phys. Rev. D* 112.1, 012021 (juill. 2025), p. 012021. DOI : [10.1103/44zp-mh1q](https://doi.org/10.1103/44zp-mh1q). arXiv : [2505.01634](https://arxiv.org/abs/2505.01634) [hep-ex]
34. ATLAS Collaboration. « Measurement of coincident photon-initiated processes in ultra-peripheral Pb+Pb collisions with the ATLAS detector ». *arXiv e-prints* (avr. 2025). arXiv : [2504.07795](https://arxiv.org/abs/2504.07795) [nucl-ex]

35. ATLAS Collaboration. « Measurements of Higgs boson production via gluon-gluon fusion and vector-boson fusion using  $H \rightarrow WW^* \rightarrow \ell\nu\ell\nu$  decays in  $pp$  collisions with the ATLAS detector and their effective field theory interpretations ». *arXiv e-prints* (avr. 2025). arXiv : 2504.07686 [hep-ex]
36. G. Aad, E. Aakvaag, B. Abbott et al. « Constraining off-shell Higgs boson production and the Higgs boson total width using  $WW \rightarrow \ell\nu\ell\nu$  final states with the ATLAS detector ». *Physics Letters B* 870, 139898 (nov. 2025), p. 139898. DOI : 10.1016/j.physletb.2025.139898. arXiv : 2504.07710 [hep-ex]
37. ATLAS Collaboration. « Measurement of high-mass  $t\bar{t}\ell^+\ell^-$  production and lepton flavour universality-inspired effective field theory interpretations at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (avr. 2025). arXiv : 2504.05919 [hep-ex]
38. ATLAS Collaboration. « Measurement of substructure-dependent suppression of large-radius jets with charged particles in Pb+Pb collisions with ATLAS ». *arXiv e-prints* (avr. 2025). arXiv : 2504.04805 [nucl-ex]
39. ATLAS Collaboration. « Evidence for the collective nature of radial flow in Pb+Pb collisions with the ATLAS detector ». *arXiv e-prints* (mars 2025). arXiv : 2503.24125 [nucl-ex]
40. ATLAS Collaboration. « Search for electroweak production of vector-like leptons in  $\tau$ -lepton and  $b$ -jet final states in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (mars 2025). arXiv : 2503.22581 [hep-ex]
41. G. Aad, E. Aakvaag, B. Abbott et al. « Search for events with one displaced vertex from long-lived neutral particles decaying into hadronic jets in the ATLAS muon spectrometer in  $pp$  collisions at  $s=13$  TeV ». *Phys. Rev. D* 112.9, 092001 (nov. 2025), p. 092001. DOI : 10.1103/cmql-s9sq. arXiv : 2503.20445 [hep-ex]
42. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « A measurement of the high-mass  $\tau\bar{\tau}$  production cross-section at  $s=13$  TeV with the ATLAS detector and constraints on new particles and couplings ». *Journal of High Energy Physics* 2025.10, 54 (oct. 2025), p. 54. DOI : 10.1007/JHEP10(2025)054. arXiv : 2503.19836 [hep-ex]
43. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Measurements of the production cross-sections of a Higgs boson in association with a vector boson and decaying into  $WW^*$  with the ATLAS detector at  $s = 13$  TeV ». *Journal of High Energy Physics* 2025.8, 34 (août 2025), p. 34. DOI : 10.1007/JHEP08(2025)034. arXiv : 2503.19420 [hep-ex]
44. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Searches for direct slepton production in the compressed-mass corridor in  $s = 13$  TeV  $pp$  collisions with the ATLAS detector ». *Journal of High Energy Physics* 2025.8, 53 (août 2025), p. 53. DOI : 10.1007/JHEP08(2025)053. arXiv : 2503.17186 [hep-ex]
45. ATLAS Collaboration. « Electroweak diboson production in association with a high-mass dijet system in semileptonic final states from  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector ». *arXiv e-prints* (mars 2025). arXiv : 2503.17461 [hep-ex]
46. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Search for a new pseudoscalar decaying into a pair of bottom and antibottom quarks in top-associated production in  $s=13$  TeV proton-proton collisions with the ATLAS detector ». *European Physical Journal C* 85.8, 886

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47. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Search for heavy neutral leptons in decays of W bosons using leptonic and semi-leptonic displaced vertices in  $s = 13$  TeV pp collisions with the ATLAS detector ». *Journal of High Energy Physics* 2025.7, 196 (juill. 2025), p. 196. DOI : [10.1007/JHEP07\(2025\)196](https://doi.org/10.1007/JHEP07(2025)196). arXiv : [2503.16213](https://arxiv.org/abs/2503.16213) [hep-ex]
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  49. « Search for Higgs boson exotic decays into Lorentz-boosted light bosons in the four- $\tau$  final state at  $\sqrt{s}=13$ TeV with the ATLAS detector ». *Physics Letters B* 870, 139843 (nov. 2025), p. 139843. DOI : [10.1016/j.physletb.2025.139843](https://doi.org/10.1016/j.physletb.2025.139843)
  50. G. Aad, E. Aakvaag, B. Abbott et al. « Measurement of the top quark mass with the ATLAS detector using  $t\bar{t}$  events with a high transverse momentum top quark ». *Physics Letters B* 867, 139608 (août 2025), p. 139608. DOI : [10.1016/j.physletb.2025.139608](https://doi.org/10.1016/j.physletb.2025.139608). arXiv : [2502.18216](https://arxiv.org/abs/2502.18216) [hep-ex]
  51. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Measurement of  $W^{\pm}$ -boson differential cross-sections in proton-proton collisions with low pile-up data at  $s=5.02$  TeV and 13TeV with the ATLAS detector ». *European Physical Journal C* 85.7, 729 (juill. 2025), p. 729. DOI : [10.1140/epjc/s10052-025-14178-x](https://doi.org/10.1140/epjc/s10052-025-14178-x). arXiv : [2502.09403](https://arxiv.org/abs/2502.09403) [hep-ex]
  52. G. Aad, E. Aakvaag, B. Abbott et al. « Weakly supervised anomaly detection for resonant new physics in the dijet final state using proton-proton collisions at  $s=13$  TeV with the ATLAS detector ». *Phys. Rev. D* 112.7, 072009 (oct. 2025), p. 072009. DOI : [10.1103/2yq5-vj59](https://doi.org/10.1103/2yq5-vj59). arXiv : [2502.09770](https://arxiv.org/abs/2502.09770) [hep-ex]
  53. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Search for long-lived charged particles using large specific ionisation loss and time of flight in  $140 \text{ fb}^{-1}$  of  $pp$  collisions at  $\sqrt{s}=13$  TeV with the ATLAS detector ». *Journal of High Energy Physics* 2025.7, 140 (juill. 2025), p. 140. DOI : [10.1007/JHEP07\(2025\)140](https://doi.org/10.1007/JHEP07(2025)140). arXiv : [2502.06694](https://arxiv.org/abs/2502.06694) [hep-ex]
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  55. G. Aad, E. Aakvaag, B. Abbott et al. « Measurement of jet track functions in  $pp$  collisions at  $\sqrt{s}=13$  TeV with the ATLAS detector ». *Physics Letters B* 868, 139680 (sept. 2025), p. 139680. DOI : [10.1016/j.physletb.2025.139680](https://doi.org/10.1016/j.physletb.2025.139680). arXiv : [2502.02062](https://arxiv.org/abs/2502.02062) [hep-ex]
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  57. G. Aad, E. Aakvaag, B. Abbott et al. « Search for charged Higgs bosons produced in top-quark decays or in association with top quarks and decaying via  $H^{\pm} \rightarrow \tau^{\pm} \nu_{\tau}$  in 13 TeV  $pp$

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58. ATLAS Collaboration, G. Aad, E. Aakvaag et al. « Differential cross-section measurements of  $D^\pm$  and  $Ds^\pm$  meson production in proton-proton collisions at  $s = 13$  TeV with the ATLAS detector ». *Journal of High Energy Physics* 2025.7, 86 (juill. 2025), p. 86. DOI : [10.1007/JHEP07\(2025\)086](https://doi.org/10.1007/JHEP07(2025)086). arXiv : [2412.15742](https://arxiv.org/abs/2412.15742) [hep-ex]
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