

# Curriculum vitae of Giovanni Pelliccioli



<b>Name</b>	Giovanni Pelliccioli
<b>Nationality</b>	Italian
<b>Date of birth</b>	24 December 1992
<b>Place of birth</b>	Bergamo (IT)
<b>Current position</b>	Researcher
<b>E-mail</b>	giovanni.pelliccioli@unimib.it

## Professional Experience

**01/10/2024 - present** Junior researcher (Ricercatore a Tempo Determinato di tipo A) in theoretical particle physics at the University of Milano-Bicocca, Department of Physics, Milano (Italy).

**01/10/2022 - 30/09/2024** Post-doc researcher in theoretical particle physics at the Max-Planck Institute for Physics, Department of Novel Computational Techniques in Particle Physics, Garching (Germany).

**03/10/2019 - 30/09/2022** Post-doc researcher in theoretical particle physics at the Julius Maximilian University of Würzburg, Institute for Theoretical Physics and Astrophysics, Würzburg (Germany).

## Education and Training

### Doctoral degree (PhD) in Theoretical Particle Physics, University of Torino (Italy) 2016-2019

- \* Degree earned: 16/09/2019.
- \* Thesis title: *Vector Boson Scattering at the LHC. A phenomenological study of massive gauge bosons polarization and precise predictions beyond leading order accuracy in the fully leptonic decay channel.*; supervisor: Ezio Maina (University of Torino).

### Master's Degree (MSc.) in Physics, University of Milano-Bicocca (Italy) 2014 - 2016

- \* Degree earned: 25/10/2016 - 110/110 *cum laude*.
- \* Thesis title: *Polarization analysis of Vector Boson Scattering events at the Large Hadron Collider*; supervisors: Marco Paganoni and Pietro Govoni (University of Milano-Bicocca), Ezio Maina (University of Torino) and Alessandro Ballestrero (INFN of Torino).

### Bachelor's Degree (BSc.) in Physics, University of Milano-Bicocca (Italy) 2011 - 2014

- \* Degree earned: 24/09/2014 - 110/110 *cum laude*.
- \* Thesis title: *Characterization of Scintillating Fibres, for Novel Calorimetric Detectors*; supervisors: Marco Paganoni and Pietro Govoni (University of Milano-Bicocca).

### High school diploma, Liceo Scientifico Statale *Lorenzo Mascheroni*, Bergamo (Italy) 2006 - 2011

- \* Degree earned: 03/07/2011 - 100/100 *cum laude*.

## Personal Skills

### Languages

- ★ Italian: mother tongue.
- ★ English: fluent.  
First Certificate in English, University of Cambridge, ESOL Examinations (B2 level), 04/2010.
- ★ German: basic knowledge.  
Zertifikat Deutsch als Fremdsprache, Würzburg Universität, (A1 level), 02/2020.

### Digital competence

- ★ Programming languages: advanced knowledge of C, FORTRAN, good knowledge of C++ and PYTHON, BASH shell scripting.
- ★ Software and libraries: good command of the CERN ROOT data-analysis library, Wolfram MATHEMATICA software system, PYTORCH machine-learning framework.
- ★ Version control: advanced command of GIT.
- ★ Operating systems: good command of LINUX and WINDOWS.

### Scientific expertise

- ★ Physics.
- ★ Mathematical methods.
- ★ Numerical simulations.
- ★ Data-analysis techniques.

### Communication

- ★ Proficient public-speaking expertise (seminars and presentations at international conferences).
- ★ Proven success in producing and publishing academic research papers (25 articles, 3 reviews).
- ★ Solid proposal-writing competence (main writer of scientific research proposals that were awarded funding by Horizon Europe and EU-COST commissions, and received the EU Seal of Excellence).
- ★ Solid peer-review experience for high-impact scientific journals (high-energy physics).
- ★ Effective teaching and training skills (teaching experience at BSc., MSc. and PhD level).

### Management competencies

- ★ Strong leadership expertise (working-group leader and P.I. in collaborative research projects).
- ★ Excellent team-coordination skills (supervision of MSc. and PhD students).
- ★ Solid event-organisation competence (main organiser of workshops, session chair at conferences).

## Research activity

### Topics

My research activity spans several aspects of theoretical particle physics:

- ★ numerical Monte Carlo simulation and phenomenology of polarised electroweak bosons at the LHC,
- ★ Monte Carlo automation and precision physics for multi-particle processes at colliders,
- ★ machine-learning techniques for classification problems at colliders,
- ★ quantum-information observables and entanglement,
- ★ strategies for the matching of fixed-order predictions to parton-shower modelling,
- ★ effective field theory in multi-boson LHC processes,
- ★ subtraction of infrared singularities in QCD beyond next-to-leading order.

### Collaborations

- ★ I have active collaborations with researchers based at Italian universities (Bologna, Milano-Bicocca, Milano-Statale, Torino), foreign universities (Freiburg, Krakow, Manchester, München, Oxford, Würzburg), and research centers (CERN, Max-Planck Institute for Physics, Italian Institute for Nuclear Physics).
- ★ 2023-present: theory collaborator of the ATLAS experiment (CERN), associated to the LAPP group (Université Grenoble Alpes, Université Savoie Mont Blanc, CNRS/IN2P3, Annecy).

- \* 2023-present: core-group member of the EU COST Action CA22130 *Comprehensive Multiboson Experiment-Theory Action* (COMETA).
- \* 2020-2023: external theory collaborator (MCI associate) of the ATLAS experiment (CERN).
- \* 2018-2022: active member of the EU COST Action CA16201 *Unraveling new physics at the LHC through the precision frontier* (PARTICLEFACE).
- \* 2016-2021: active member of the EU COST Action CA16108 *Vector Boson Scattering Coordination and Action Network* (VBSCan).

## Funding

My research activity has been supported by:

- \* the EU COST (European Cooperation in Science and Technology), within the VBSCan-CA16108 [2017-2021], PARTICLEFACE-CA16201 [2018-2021], and COMETA-CA22130 [2023-present] actions;
- \* the Max-Planck Society (MPG), within the research group *Novel computational methods in particle physics* at the Max-Planck Institute for Physics [2022-present];
- \* the German Federal Ministry for Education and Research (BMBF), within the projects Nr. 05H18WWCA1 and 05H21WWCAA [2019-2022];
- \* the Italian Ministry for Education, University and Research (MIUR) by means of the assignment of a PhD scholarship (XXXII cycle) at the University of Torino [2016-2019];
- \* the Italian Institute for Nuclear Physics (INFN), within the projects *SPIF (Precision Studies of Fundamental Interactions)* [2016-2019] and *QFT@Colliders* [2024-present].

## Other activities

### Teaching

- \* Teaching assistant for the course *Laboratory of Informatics 1* (Bachelor's Degree in Physics) held by L. Bernardinello and F. Nati, University of Milano-Bicocca (Italy), 03/2025 - present.
- \* Teaching assistant for the course *Quantum Field Theory 2* (Master's Degree in Physics) held by A. Denner, University of Würzburg (Germany), 04-08/2022.
- \* Lecturer for the Uni.-Freiburg Graduate School, University of Freiburg (Germany), 24/11/2021: *Accessing weak-boson polarizations: theory modelling and LHC phenomenology*.
- \* Lecturer at the *Advanced VBS training school* for PhD students, University of Milano-Bicocca (Italy), 29/08 - 03/09/2021: *Polarization theory - part II: vector-boson scattering and the PHANTOM MC*.
- \* Teaching assistant for the course *Electricity and Magnetism* held by E. Menichetti and A. Ferretti (Bachelor's Degree in Physics), University of Torino (Italy), 10-12/2017.

### Student supervision

- \* Co-supervisor of the final project of one MSc. student in Physics at the University of Milano-Bicocca, Italy: 01/2025 - present.
- \* Co-supervisor of the research project of one PhD student in Physics at the University of Würzburg, Germany: 06/2021 - present).
- \* Co-supervisor of the final project of three MSc. students in Mathematical Engineering at Politecnico di Milano (Italy): 03-07/2017, 04-06/2018.

### Referee activity (for peer-reviewed scientific journals)

- \* for the *Journal of High Energy Physics* (JHEP): as of 09/2021.
- \* for the *European Physical Journal* (EPJC, EPJ Plus): as of 08/2023.
- \* for the *Physics Letters B* (PLB): as of 02/2024.

### Management and event-organisation

- \* Member of the Organising Committee of the *COMETA Workshop on Vector-Boson Polarisation*s, Toulouse (France), 23-24/09/2024.
- \* Member of the Organising Committee of the *EFT in Multiboson Production*, Padova (Italy), 10-11/06/2024.
- \* Member of the Organising Committee of the *1st COMETA General Meeting* at Bakırçay University, Izmir (Türkiye), 28/02-01/03/2024.

- \* Member of the Management Committee (representing Germany) for the COST Action COMETA, 06/2023 - present.
- \* Co-responsible for the organization of theory seminars at Max-Planck Institute for Physics, Garching bei München (Germany), 10/2022 - 02/2024.
- \* Responsible for the organization of particle physics seminars (TP2, Institut für Theoretische Physik, Universität Würzburg), Würzburg (Germany), 01/2020 - 02/2022.
- \* Member of the Organising Committee of the *VBS Polarization Workshop* at Laboratoires Leprince Ringuet (Ecole Polytechnique), Palaiseau (France), 10-12/10/2018.

### Convenership

- \* Convener of the electroweak session of the *Large Hadron Collider Physics (LHCP2025) conference*, Taipei (Taiwan), 05-09/05/2025.
- \* Convener of the Working Group 1 (*Theoretical framework, precision calculations and simulation*) and member of the Core Group of the COST Action COMETA, 09/2023 - present.
- \* Convener of the electroweak & top-quark session of the *2023 International Workshop on the High Energy Circular Electron Positron Collider*, Nanjing (China), 23-27/10/2023.

### Representation

- \* Member of the department council as an RTD-A researcher (University of Milano-Bicocca, Department of Physics), Milano (Italy), 10/2024 - present.
- \* Representative of doctoral students in the department council (University of Torino, Department of Physics), Torino (Italy), 10/2017 - 09/2018.

### Proposal writing

- \* My proposal POEBLITA – POLarised Electroweak Bosons at the LHC with Improved Theoretical Accuracy (as PI, in collaboration with the University of Milano-Bicocca), submitted under the HORIZON-MSCA-2023-PF-01 call (MSCA Postdoctoral Fellowships 2023), was awarded funding by the EU commission Horizon Europe for two years. Grant: 172.750,08 euros.
- \* The proposal COMETA – Comprehensive Multiboson Experiment-Theory Action (as core-group writer), submitted under the OC-2022-1 call (COST Actions 2022), was awarded funding by the European Cooperation in Science and Technology commission for four years. Grant: 150.000,00 euros/year.
- \* My proposal PREPOLE – Precise pREdictions for POLarized Electroweak bosons at the LHC (as PI, in collaboration with CERN), submitted under the HORIZON-MSCA-2021-PF-01 call (MSCA Postdoctoral Fellowships 2021), was awarded the Seal of Excellence of the EU commission Horizon Europe.

## List of publications (on peer-reviewed journals)

### Articles

1. M. Grossi, G. Pelliccioli and A. Vicini, *From angular coefficients to quantum observables: a phenomenological appraisal in di-boson systems*, JHEP **12**, 120 (2024) doi:10.1007/JHEP12(2024)120
2. A. Denner, C. Haitz and G. Pelliccioli, *NLO EW and QCD corrections to polarised same-sign WW scattering at the LHC*, JHEP **11** (2024), 115. doi:10.1007/JHEP11(2024)115
3. A. Denner, D. Lombardi, S. L. P. Chavez and G. Pelliccioli, *NLO corrections to triple vector-boson production in final states with three charged leptons and two jets*, JHEP **09** (2024), 187. doi:10.1007/JHEP09(2024)187
4. H. El Faham, G. Pelliccioli and E. Vryonidou *Triple-gauge couplings in LHC diboson production: a SMEFT view from every angle*, JHEP **08** (2024), 87. doi:10.1007/JHEP08(2024)087
5. A. Denner, C. Haitz and G. Pelliccioli, *NLO EW corrections to polarised  $W^+W^-$  production and decay at the LHC*, Phys. Lett. B **850** (2024), 138539. doi:10.1016/j.physletb.2024.138539
6. G. Pelliccioli and G. Zanderighi, *Polarised-boson pairs at the LHC with NLOPS accuracy*, Eur. Phys. J. C **84**, 16 (2024) doi.org/10.1140/epjc/s10052-023-12347-4.

7. A. Denner, D. Lombardi and G. Pelliccioli, *Complete NLO corrections to off-shell  $t\bar{t}Z$  production at the LHC*, JHEP **09** (2023), 72. doi:10.1007/JHEP09(2023)072
8. M. Grossi, M. Incudini, M. Pellen and G. Pelliccioli, *Amplitude-assisted tagging of longitudinally polarised bosons using wide neural networks*, Eur. Phys. J. C **83**, 759 (2023). doi.org/10.1140/epjc/s10052-023-11931-y
9. A. Denner, M. Pellen and G. Pelliccioli, *NLO QCD corrections to off-shell top-antitop production with semi-leptonic decays at lepton colliders*, Eur. Phys. J. C **83**, 353 (2023). doi:10.1140/epjc/s10052-023-11500-3
10. G. Bertolotti, G. Pelliccioli et al., *NNLO subtraction for any massless final state: a complete analytic expression*, JHEP **07** (2023), 140. doi:10.1007/JHEP07(2023)140
11. A. Denner, C. Haitz and G. Pelliccioli, *NLO QCD corrections to polarized diboson production in semileptonic final states*, Phys. Rev. D **107** (2023) no.5, 053004. doi:10.1103/PhysRevD.107.053004
12. A. Denner, G. Pelliccioli and C. Schwan, *NLO QCD and EW corrections to off-shell  $tZj$  production at the LHC*, JHEP **10** (2022), 125. doi:10.1007/JHEP10(2022)125
13. A. Denner and G. Pelliccioli, *NLO EW and QCD corrections to polarized ZZ production in the four-charged-lepton channel at the LHC*, JHEP **10** (2021), 097. doi:10.1007/JHEP10(2021)097
14. E. Maina and G. Pelliccioli, *Polarized Z bosons from the decay of a Higgs boson produced in association with two jets at the LHC*, Eur. Phys. J. C **81** (2021) no.11, 989. doi:10.1140/epjc/s10052-021-09774-6
15. A. Denner and G. Pelliccioli, *Combined NLO EW and QCD corrections to off-shell  $t\bar{t}W$  production at the LHC*, Eur. Phys. J. C **81** (2021) no.4, 354. doi:10.1140/epjc/s10052-021-09143-3
16. L. Magnea, G. Pelliccioli et al. *Analytic integration of soft and collinear radiation in factorised QCD cross sections at NNLO*, JHEP **02** (2021), 037. doi:10.1007/JHEP02(2021)037
17. A. Denner and G. Pelliccioli, *NLO QCD predictions for doubly-polarized WZ production at the LHC*, Phys. Lett. B **814** (2021), 136107. doi:10.1016/j.physletb.2021.136107
18. A. Denner and G. Pelliccioli, *NLO QCD corrections to off-shell  $t\bar{t}W^+$  production at the LHC*, JHEP **11** (2020), 069. doi:10.1007/JHEP11(2020)069
19. A. Ballestrero, E. Maina and G. Pelliccioli, *Different polarization definitions in same-sign WW scattering at the LHC*, Phys. Lett. B **811** (2020), 135856. doi:10.1016/j.physletb.2020.135856
20. A. Denner and G. Pelliccioli, *Polarized electroweak bosons in  $W^+W^-$  production at the LHC including NLO QCD effects*, JHEP **09** (2020), 164. doi:10.1007/JHEP09(2020)164
21. A. Ballestrero, E. Maina and G. Pelliccioli, *Polarized vector boson scattering in the fully leptonic WZ and ZZ channels at the LHC*, JHEP **09** (2019), 087. doi:10.1007/JHEP09(2019)087
22. L. Magnea, G. Pelliccioli et al., *Factorisation and Subtraction beyond NLO*, JHEP **12** (2018), 062. doi:10.1007/JHEP12(2018)062
23. L. Magnea, G. Pelliccioli et al., *Local analytic sector subtraction at NNLO*, JHEP **12** (2018), 107. doi:10.1007/JHEP12(2018)107
24. A. Ballestrero, G. Pelliccioli et al., *Precise predictions for same-sign W-boson scattering at the LHC*, Eur. Phys. J. C **78** (2018) no.8, 671. doi:10.1140/epjc/s10052-018-6136-y
25. A. Ballestrero, E. Maina and G. Pelliccioli, *W boson polarization in vector boson scattering at the LHC*, JHEP **03** (2018), 170. doi:10.1007/JHEP03(2018)170

## Reviews

1. D. Buarque, G. Pelliccioli et al. *Vector Boson Scattering Processes: Status and Prospects*, Reviews in Physics, 2022, 100071. doi:10.1016/j.revip.2022.100071

2. W. J. Torres Bobadilla, G. Pelliccioli et al., *May the four be with you: Novel IR-subtraction methods to tackle NNLO calculations*, Eur. Phys. J. C **81** (2021) no.3, 250. doi:10.1140/epjc/s10052-021-08996-y
3. C. F. Anders, G. Pelliccioli et al., *Vector boson scattering: Recent experimental and theory developments*, Rev. Phys. **3** (2018) 44. doi:10.1016/j.revip.2018.11.001

## Dissemination

### Invited presentations at international conferences (10 most relevant)

1. *Theory and phenomenology of gauge-boson polarisations at the LHC*. Invited parallel talk at the QCD@LHC 2024 conference, Freiburg im Breisgau (Germany), 08/10/2024.
2. *Precise and accurate predictions for polarised bosons at the LHC*. Invited plenary talk at the Multi-Boson Interactions 2024 conference, Toulouse (France), 25/09/2024.
3. *Electroweak and QCD corrections to off-shell single-top production in association with a Z boson at the LHC*. Invited parallel talk at the conference RADCOR 2023, 16th International Symposium on Radiative Corrections: Applications of Quantum Field Theory to Phenomenology, Crieff, Scotland (UK), 30/05/2023.
4. *Higher-order and off-shell effects in top-quark processes at high-energy colliders*. Invited parallel talk at the conference LHCP 2023, 11th Edition of the Large Hadron Collider Physics Conference, Belgrade (Serbia), 24/05/2023.
5. *Precise predictions for polarised weak bosons at the LHC*. Invited talk at the conference Rencontres de Moriond 2023, QCD session, La Tuile (Italy), 26/03/2023.
6. *Theoretical predictions for polarized electroweak bosons at the LHC*. Invited plenary talk at the SM@LHC2022 (Standard Model at LHC) conference, CERN, Geneve (Switzerland), 14/04/2022.
7. *Polarized  $W^\pm$  and Z bosons in multi-boson processes at the LHC*. Invited plenary talk at the Multi-Boson Interactions 2021 conference, University of Milano-Bicocca, Milano (Italy), 25/08/2021.
8. *NLO electroweak and QCD corrections to off-shell  $ttW$  production at the LHC*. Parallel talk at the RADCOR & LoopFest 2021 conference (on-line), 19/05/2021.
9. *Polarized Weak Bosons in VBS at the LHC*. Invited plenary talk at the Multi-Boson Interactions 2019 conference, Aristotle University of Thessaloniki, Thessaloniki (Greece), 26/08/2019.
10. *Local Analytic Sector Subtraction at NNLO*. Parallel talk at the XXVII International Workshop on Deep Inelastic Scattering and Related Subjects, Torino (Italy), 10/04/2019.

### Invited seminars (5 most recent)

1. *Electroweak-boson pairs at the LHC: a look from every angle*. Invited seminar at the University of Bologna, Bologna (Italy), 04/12/2024.
2. *Unveiling the polarisation of weak bosons in LHC processes*. Invited contribution to the Collider Cross Talks (with Luka Selem), CERN, Geneve (Switzerland), 15/02/2024.
3. *Higher-order corrections for polarised-boson production and decay at the LHC*. Invited seminar at the Joint INFN-UNIMI-UNIMIB Pheno Seminars University, Milano (Italy), 18/12/2023.
4. *Unveiling the polarisation of weak bosons at the LHC: Monte Carlo automation and neural-network strategies*. Invited seminar at the University of Torino, Torino (Italy), 12/12/2023.
5. *Theoretical predictions for polarized electroweak bosons at the LHC*. Invited seminar at the Institute of Nuclear and Particle Physics, Technical University of Dresden, Dresden (Germany), 05/05/2022.

The Curriculum Vitae is true and correct as at 18/02/2025.