

EMANUELE RE: CURRICULUM VITAE (SHORT VERSION)

Name Emanuele Re

Nationality Italian

Positions

From Oct. 2021 Professore Associato (Associate Professor)
Dipartimento di Fisica, Università degli Studi di Milano-Bicocca

Oct. 2015 - CNRS chargé de recherche de Classe Normale
CNRS researcher, permanent position, LAPTh, Annecy

Oct 2016 - Research Fellow (on leave from CNRS)
Sept 2019 Theoretical Physics Department, CERN, Geneva

Oct. 2012 - Postdoc Research Associate
Sept. 2015 Department of Physics, University of Oxford

Oct. 2009 - Postdoc Research Associate
Sept. 2012 IPPP, Department of Physics, University of Durham

Education

2009 **Ph.D.**, 24 November 2009
Università degli Studi di Milano-Bicocca
Thesis title: *Next-to-Leading-Order QCD corrections to Shower Monte Carlo event generators: single vector-boson and single-top hadroproduction*
Tutor: Paolo Nason

2006 **Laurea magistralis in Physics**, *cum laude*, 29 September 2006
Università degli Studi di Milano-Bicocca

2004 **Laurea in Physics**, *cum laude*, 15 October 2004
Università degli Studi di Milano-Bicocca

Teaching and Mentoring

spring 2022 Taught course at Master Level in Physics (“Laurea Magistrale”)
 (“Theory and Phenomenology of Fundamental Interaction”, 42+4 hours,
Milano-Bicocca)

Feb. 2022 Taught course at PhD Level at the University of Milano
 (“Computational, simulation and machine learning methods in high energy
physics and beyond: Monte Carlo methods”, 15 hours, shared with an other
lecturer)

fall 2021	Taught course at Bachelor Level in Physics (“Laurea”, third year) (“Special Relativity”, 48+6 hours, Milano-Bicocca)	
spring 2021	Supervision of a master student (M2) (T. Pascal, “Interplay of Fixed-Order and Resummation in Perturbative QCD: Applications to LHC Physics”, LAPTh, Annecy)	
June 2018	Invited lecturer at the International Summer School of QCD (PhD level) (“Introduction to Monte Carlo event generators”, 6 hours) LPT Orsay, June 2018	
Sept. 2017	Tutor (discussion leader) at the 2017 European School of High-Energy Physics (PhD level, several topics, ~ 10 hours) Evora, Portugal, September 2017	
spring 2014	Junior assessor for final-year projects in Theoretical Physics (MPhys level, Ox- ford)	
2012 - 2015	Taught graduate course in Theoretical Physics (PhD level) (“Introduction to Symmetries”, 8+2 hours, Oxford)	[3 terms]
winter 2012	Tutor (“Retained Lecturer”) in Physics at Wadham College, Oxford (“Subatomic Physics”, 3rd year, 15 hours, 8 students)	
Sept. 2012	Tutor at the 42nd BUSSTEPP Summer School (PhD level) (Several topics in theoretical particle Physics - aimed at first-year PhD students from the UK, 10 hours)	
2009 - 2012	Tutor in the first-year courses in Physics (level 1) (“Foundations of Physics 1”, 20 hours/group, 2 groups + problems marking, Durham)	[3 academic years]
fall 2008	Teaching Assistant in the third-year courses in Physics (“Introduction to Quantum Mechanics”, 20 hours, Milano-Bicocca)	
fall 2007	Tutor in the third-year courses in Physics (“Introduction to Quantum Mechanics”, 30 hours, Milano-Bicocca)	

Organization of scientific meetings and schools

- Convener of the “Standard Model Physics at the TeV Scale” session at “PANIC 2021”, Lisbon, September 2021 (originally planned for 2020, postponed due to COVID-19 pandemic)
- Member of the CERN-Fermilab HCPSS International Advisory Committee
- Organizer of the workshop “Taming the accuracy of event generators”, CERN, 29 June-10 July 2020 & 23-27 August 2021
- Chair of the 14th CERN-Fermilab HCPSS (joint CERN-Fermilab “Hadron Collider Physics Summer School”), CERN, 28th August-6 September 2019

- Convener for the “QCD” session at “LHCP 2019”, Puebla, Mexico, May 2019
- Convener for the “Hadronic and Electroweak Observables” session at “DIS 2018”, Kobe, Japan, April 2018
- Organizer of the “Tools 2017” workshop, Corfu, September 2017
- Organizer and convener of the “PhysTeV” workshop, Les Houches: June 2017 (organizer+convener), June 2019 (organizer+convener), June 2021 (organizer), June 2023 (organizer)
- Convener for the “Monte Carlo” session at “QCD@LHC 2016”, Zurich, August 2016
- Organizer of GraSPA (“Graduate Summer School in Particle and Astroparticle Physics” of Annecy-le-Vieux), LAPTh/LAPP, Annecy: July 2016, July 2017, July 2018, July 2019, July 2020 (canceled), August 2021
- Organizer of the 2016 edition of RPP (“Rencontre de Physique des Particules”), LAPTh, January 2016.
- Co-organizer of the Workshop “V + jets: Backgrounds for new physics and testing ground for QCD”, IPPP, Durham, 8-10 September 2010

Institutional responsibilities and community work

- Referee for: PRD, JHEP, PLB, EPJC, PRL, SciPost Phys.
 - Grant proposal reviewer for: NWO (Netherlands Organisation for Scientific Research), NCN (National Science Centre of Poland), Fondazione Cariplo
 - External examiner for a PhD thesis (June/September 2017, CP3, Université catholique de Louvain, Louvain-la-Neuve)
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- TH organizer of the “Collider Cross Talk” seminars at the CERN TH Department, from October 2017 to September 2019
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- Convener of the working group “QCD at short distances: experiment, theory and tools” of the GDR-QCD (“Groupement De Recherche Chromodynamique Quantique”), from January to September 2021
 - Convener of the “ggH” subgroup within the “LHC Higgs Cross Section Working Group”, from September 2019 to June 2021
 - Convener of the “VH” subgroup within the “LHC Higgs Cross Section Working Group”, from January 2018 to September 2019
 - TH contact for the “single top” studies for the HL/HE LHC, from April 2018 to February 2019

List of publications¹

Journal articles

- [1] S. Alioli, P. Nason, C. Oleari, and E. Re, *NLO vector-boson production matched with shower in POWHEG*, *JHEP* **07** (2008) 060, [0805.4802].
- [2] S. Alioli, P. Nason, C. Oleari, and E. Re, *NLO Higgs boson production via gluon fusion matched with shower in POWHEG*, *JHEP* **04** (2009) 002, [0812.0578].
- [3] S. Alioli, P. Nason, C. Oleari, and E. Re, *NLO single-top production matched with shower in POWHEG: s- and t-channel contributions*, *JHEP* **09** (2009) 111, [0907.4076].
- [4] S. Alioli, P. Nason, C. Oleari, and E. Re, *A general framework for implementing NLO calculations in shower Monte Carlo programs: the POWHEG BOX*, *JHEP* **06** (2010) 043, [1002.2581].
- [5] E. Re, *Single-top Wt-channel production matched with parton showers using the POWHEG method*, *Eur. Phys. J.* **C71** (2011) 1547, [1009.2450].
- [6] S. Alioli, P. Nason, C. Oleari, and E. Re, *Vector boson plus one jet production in POWHEG*, *JHEP* **01** (2011) 095, [1009.5594].
- [7] S. Alioli, K. Hamilton, P. Nason, C. Oleari, and E. Re, *Jet pair production in POWHEG*, *JHEP* **04** (2011) 081, [1012.3380].
- [8] S. Alioli, K. Hamilton, and E. Re, *Practical improvements and merging of POWHEG simulations for vector boson production*, *JHEP* **09** (2011) 104, [1108.0909].
- [9] C. Englert, J. Jaeckel, E. Re, and M. Spannowsky, *Evasive Higgs Maneuvers at the LHC*, *Phys.Rev.* **D85** (2012) 035008, [1111.1719].
- [10] S. Alioli, J. R. Andersen, C. Oleari, E. Re, and J. M. Smillie, *Probing higher-order corrections in dijet production at the LHC*, *Phys.Rev.* **D85** (2012) 114034, [1202.1475].
- [11] E. Re, *NLO corrections merged with parton showers for Z+2 jets production using the POWHEG method*, *JHEP* **1210** (2012) 031, [1204.5433].
- [12] R. Frederix, E. Re, and P. Torrielli, *Single-top t-channel hadroproduction in the four-flavour scheme with POWHEG and aMC@NLO*, *JHEP* **1209** (2012) 130, [1207.5391].
- [13] C. Englert, E. Re, and M. Spannowsky, *Triplet Higgs Collider Phenomenology after LHC*, *Phys.Rev.* **D87** (2013) 095014, [1302.6505].
- [14] C. Englert, E. Re, and M. Spannowsky, *Pinning down Higgs triplets at the LHC*, *Phys.Rev.* **D88** (2013) 035024, [1306.6228].
- [15] K. Hamilton, P. Nason, E. Re, and G. Zanderighi, *NNLOPS simulation of Higgs boson production*, *JHEP* **1310** (2013) 222, [1309.0017].
- [16] U. Haisch, F. Kahlhoefer, and E. Re, *QCD effects in mono-jet searches for dark matter*, *JHEP* **1312** (2013) 007, [1310.4491].

¹List with updated citations is available online from the SPIRES database.

- [17] U. Haisch, A. Hibbs, and E. Re, *Determining the structure of dark-matter couplings at the LHC*, *Phys.Rev.* **D89** (2014) 034009, [1311.7131].
- [18] C. Englert and E. Re, *Bounding the top Yukawa with Higgs-associated single-top production*, *Phys.Rev.* **D89** (2014) 073020, [1402.0445].
- [19] A. Karlberg, E. Re, and G. Zanderighi, *NNLOPS accurate Drell-Yan production*, *JHEP* **1409** (2014) 134, [1407.2940].
- [20] J. M. Campbell, R. K. Ellis, P. Nason, and E. Re, *Top-pair production and decay at NLO matched with parton showers*, *JHEP* **1504** (2015) 114, [1412.1828].
- [21] U. Haisch and E. Re, *Simplified dark matter top-quark interactions at the LHC*, *JHEP* **1506** (2015) 078, [1503.00691].
- [22] R. Gauld, U. Haisch, B. D. Pecjak, and E. Re, *Beauty-quark and charm-quark pair production asymmetries at LHCb*, *Phys. Rev.* **D92** (2015) 034007, [1505.02429].
- [23] J. Abdallah *et al.*, *Simplified Models for Dark Matter Searches at the LHC*, *Phys. Dark Univ.* **9-10** (2015) 8–23, [1506.03116].
- [24] S. Alioli *et al.*, *Precision studies of observables in $pp \rightarrow W \rightarrow l\nu_l$ and $pp \rightarrow \gamma, Z \rightarrow l^+l^-$ processes at the LHC*, *Eur. Phys. J.* **C77** (2017), no. 5 280, [1606.02330].
- [25] W. Astill, W. Bizon, E. Re, and G. Zanderighi, *NNLOPS accurate associated HW production*, *JHEP* **06** (2016) 154, [1603.01620].
- [26] P. F. Monni, E. Re, and P. Torrielli, *Higgs Transverse-Momentum Resummation in Direct Space*, *Phys. Rev. Lett.* **116** (2016), no. 24 242001, [1604.02191].
- [27] K. Hamilton, T. Melia, P. F. Monni, E. Re, and G. Zanderighi, *Merging WW and WW+jet with MINLO*, *JHEP* **09** (2016) 057, [1606.07062].
- [28] F. Bishara, U. Haisch, P. F. Monni, and E. Re, *Constraining Light-Quark Yukawa Couplings from Higgs Distributions*, *Phys. Rev. Lett.* **118** (2017), no. 12 121801, [1606.09253].
- [29] W. Bizon, P. F. Monni, E. Re, L. Rottoli, and P. Torrielli, *Momentum-space resummation for transverse observables and the Higgs p_\perp at $N^3LL+NNLO$* , *JHEP* **02** (2018) 108, [1705.09127].
- [30] W. Astill, W. Bizon, E. Re, and G. Zanderighi, *NNLOPS accurate associated HZ production with $H \rightarrow b\bar{b}$ decay at NLO*, *JHEP* **11** (2018) 157, [1804.08141].
- [31] W. Bizoń, X. Chen, A. Gehrmann-De Ridder, T. Gehrmann, N. Glover, A. Huss, P. F. Monni, E. Re, L. Rottoli, and P. Torrielli, *Fiducial distributions in Higgs and Drell-Yan production at $N^3LL+NNLO$* , *JHEP* **12** (2018) 132, [1805.05916].
- [32] E. Re, M. Wiesemann, and G. Zanderighi, *NNLOPS accurate predictions for W^+W^- production*, *JHEP* **12** (2018) 121, [1805.09857].
- [33] J. Bellm *et al.*, *Jet Cross Sections at the LHC and the Quest for Higher Precision*, *Eur. Phys. J.* **C80** (2020), no. 2 93, [1903.12563].
- [34] W. Bizon, A. Gehrmann-De Ridder, T. Gehrmann, N. Glover, A. Huss, P. F. Monni, E. Re, L. Rottoli, and D. M. Walker, *The transverse momentum spectrum of weak gauge bosons at $N^3LL + NNLO$* , *Eur. Phys. J.* **C79** (2019), no. 10 868, [1905.05171].

- [35] P. F. Monni, P. Nason, E. Re, M. Wiesemann, and G. Zanderighi, *MiNNLO_{PS}: A new method to match NNLO QCD to parton showers*, *JHEP* **05** (2020) 143, [1908.06987].
- [36] W. Bizoń, E. Re, and G. Zanderighi, *NNLOPS description of the $H \rightarrow b\bar{b}$ decay with MINLO*, *JHEP* **06** (2020) 006, [1912.09982].
- [37] S. Kallweit, E. Re, L. Rottoli, and M. Wiesemann, *Accurate single- and double-differential resummation of colour-singlet processes with MATRIX+RADISH: W^+W^- production at the LHC*, *JHEP* **12** (2020) 147, [2004.07720].
- [38] K. Becker *et al.*, *Precise predictions for boosted Higgs production*, 2005.07762.
- [39] M. Chiesa, C. Oleari, and E. Re, *NLO QCD+NLO EW corrections to diboson production matched to parton shower*, *Eur. Phys. J.* **C80** (2020) 849, [2005.12146].
- [40] P. F. Monni, E. Re, and M. Wiesemann, *MiNNLOPS: optimizing $2 \rightarrow 1$ hadronic processes*, *Eur. Phys. J. C* **80** (2020), no. 11 1075, [2006.04133].
- [41] J. Mazzitelli, P. F. Monni, P. Nason, E. Re, M. Wiesemann, and G. Zanderighi, *Next-to-Next-to-Leading Order Event Generation for Top-Quark Pair Production*, *Phys. Rev. Lett.* **127** (2021), no. 6 062001, [2012.14267].
- [42] E. Re, L. Rottoli, and P. Torrielli, *Fiducial Higgs and Drell-Yan distributions at $N^3LL'+NNLO$ with RadISH*, 2104.07509.
- [43] S. Zanolini, M. Chiesa, E. Re, M. Wiesemann, and G. Zanderighi, *Next-to-next-to-leading order event generation for VH production with $H \rightarrow b\bar{b}$ decay*, 2112.04168.
- [44] J. Mazzitelli, P. F. Monni, P. Nason, E. Re, M. Wiesemann, and G. Zanderighi, *Top-pair production at the LHC with MINNLO_{PS}*, *JHEP* **04** (2022) 079, [2112.12135].
- [45] X. Chen, T. Gehrmann, E. W. N. Glover, A. Huss, P. Monni, E. Re, L. Rottoli, and P. Torrielli, *Third order fiducial predictions for Drell-Yan at the LHC*, 2203.01565.
- [46] A. Gavardi, C. Oleari, and E. Re, *NNLO+PS Monte Carlo simulation of photon pair production with MiNNLOPS*, 2204.12602.

Conference proceedings & Working Group reports

- [47] E. Re, *Single-top production with the POWHEG method*, *PoS DIS2010* (2010) 172, [1007.0498].
- [48] E. Re, *State-of-the-art generators for top physics*, *Nuovo Cim.* **C035N3** (2012) 13–18.
- [49] J. A. Maestre, S. Alioli, J. Andersen, R. Ball, A. Buckley, *et al.*, *The SM and NLO Multileg and SM MC Working Groups: Summary Report*, 1203.6803.
- [50] E. Re, *Reaching NNLOPS accuracy with POWHEG and MiNLO*, *Nuovo Cim.* **C037N2** (2014) 137–142, [1401.2944].
- [51] E. Re, *Higgs production at NNLOPS*, 1405.7079.
- [52] D. Abercrombie *et al.*, *Dark Matter Benchmark Models for Early LHC Run-2 Searches: Report of the ATLAS/CMS Dark Matter Forum*, 1507.00966.

- [53] E. Re, *Latest theory developments for top pair production, generators and showering*, *PoS TOP2015* (2016) 012, [1601.03647].
- [54] M. L. Mangano *et al.*, *Physics at a 100 TeV pp collider: Standard Model processes*, *CERN Yellow Report* (2017), no. 3 1–254, [1607.01831].
- [55] **LHC Higgs Cross Section Working Group** Collaboration, D. de Florian *et al.*, *Handbook of LHC Higgs Cross Sections: 4. Deciphering the Nature of the Higgs Sector*, 1610.07922.
- [56] E. Re, *Latest developments in the simulation of final states involving top-pair and heavy bosons*, *PoS ICHEP2016* (2017) 657.
- [57] E. Re, *Predictions for exclusive Higgs cross sections*, 1710.08869.
- [58] J. R. Andersen *et al.*, *Les Houches 2017: Physics at TeV Colliders Standard Model Working Group Report*, 1803.07977.
- [59] E. Re, *W^+W^- production at NNLO+PS*, *PoS DIS2018* (2018) 115, [1808.09103].
- [60] M. Cepeda *et al.*, *Report from Working Group 2*, *CERN Yellow Rep. Monogr.* **7** (2019) 221–584, [1902.00134].
- [61] P. Azzi *et al.*, *Report from Working Group 1*, *CERN Yellow Rep. Monogr.* **7** (2019) 1–220, [1902.04070].
- [62] S. Alioli *et al.*, *Monte Carlo event generators for high energy particle physics event simulation*, 1902.01674.
- [63] S. Amoroso *et al.*, *Les Houches 2019: Physics at TeV Colliders: Standard Model Working Group Report*, in *11th Les Houches Workshop on Physics at TeV Colliders: PhysTeV Les Houches*, 3, 2020. 2003.01700.
- [64] E. Re, *MiNNLO_{PS}: a new method to match NNLO QCD with parton showers*, in *55th Rencontres de Moriond on QCD and High Energy Interactions*, 7, 2021. 2107.06753.
- [65] **HSF Physics Event Generator WG** Collaboration, E. Yazgan *et al.*, *HL-LHC Computing Review Stage-2, Common Software Projects: Event Generators*, 2109.14938.
- [66] E. Re, *Recent progress on high order calculations and matching to parton showers*, *PoS LHCP2021* (2021) 270, [2110.02183].
- [67] L. Buonocore *et al.*, *NNLO+PS with MiNNLO_{PS}: status and prospects*, 2203.07240.
- [68] J. M. Campbell *et al.*, *Event Generators for High-Energy Physics Experiments*, in *2022 Snowmass Summer Study*, 3, 2022. 2203.11110.