Fabrizio Caola

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Personal

Born on February 14, 1983

Nationality: Italian

Positions Held

Since Oct. 2016: Assistant Professor, IPPP Durham

Nov. 2014 – Oct. 2017: Fellow, CERN Theory Division

(Since Jan. 2017: *on leave from Durham University*)

Jul. 2014 – Nov. 2014: Visiting Fellow, Karlsruhe Institute of Technology, TTP

Aug. 2011 – Jul. 2014: Post-Doctoral Fellow, Johns Hopkins University

Jan. 2011 – Jul. 2011: Fulbright Visiting Student Researcher, Fermilab

Education

Ph.D. Physics, Università di Milano and INFN, July 2011

Ph.D. Thesis: *High-Energy Resummation in Perturbative QCD: Theory and Phenomenology*
Advisor: Prof. Stefano Forte

M.S. Physics (*Laurea Magistrale*) , Università di Milano, October 2007

Master Thesis: *Geometric scaling in perturbative QCD*
Advisor: Prof. Stefano Forte
Mark: 110/110 *cum laude*

Concert Pianist Degree, Conservatorio di Musica G. Verdi di Milano, July 2007

Advisor: M. Paolo Bordoni
Mark: 10/10

B.S. Physics (*Laurea Triennale*) , Università di Milano, October 2005

Thesis: *Fenomenologia della funzione di struttura F_2 per il protone a piccolo x*

Advisor: Prof. Stefano Forte

Mark: 110/110 *cum laude*

Awards

Guido Altarelli Award, *for seminal contributions to deep-inelastic scattering and perturbative QCD which have spurred new experimental measurements and new theoretical insights in the physics of fundamental interactions*, 2016

Martin and Beate Block Award, Aspen Center for Physics, 2016

Fulbright Visiting Student Researcher Fellowship, 2010

Premio Galluzzi per la Fisica, 2008, awarded by the University of Roma 3. National-level Prize for Academic Excellence in Physics

Research Interests

QCD and collider phenomenology

Scattering amplitudes and higher-order computations

Resummation and all-order results in QFT

Publication List

An always up to date list of all my publications, including citations information, can be found on the INSPIRE Data system at the following address

`http://inspirehep.net/search?p=author%3AF.Caola.1%20AND%20collection%3Aciteable`

Journal Papers

F. Caola, G. Luisoni, K. Melnikov and R. Röntsch, "NNLO QCD corrections to associated WH production and $H \to b\bar{b}$ decay, [arXiv:1712.06954]

F. Caola, K. Melnikov and R. Röntsch, "Nested soft-collinear subtractions in NNLO QCD computations", Eur.Phys.J. C77 (2017) no.4, 248 [arXiv:1702.01352]

S. Alioli, F. Caola, G. Luisoni and R. Röntsch, "ZZ production in gluon fusion at NLO matched to parton-shower", Phys.Rev. D95 (2017) no.3, 034042 [arXiv:1609:09719]

F. Caola, S. Forte, S. Marzani, C. Muselli and G. Vita, *"The Higgs transverse momentum spectrum with finite quark masses beyond leading order"*, JHEP 1608 (2016) 150 [arXiv:1606.04100]

F. Caola, M. Dowling, K. Melnikov, R. Röntsch and L. Tancredi, *"QCD corrections to vector boson pair production in gluon fusion including interference effects with off-shell Higgs at the LHC"*, JHEP 1607 (2016) 087 [arXiv:1605.04610]

F. Caola, K. Melnikov, R. Röntsch and L. Tancredi, *"QCD corrections to W^+W^- production through gluon fusion"*, Phys. Lett. B754 (2016) 275-280 [arXiv:1511.08617]

A. Banfi, F. Caola, F. Dreyer, P. Monni, G. Salam, G. Zanderighi and F. Dulat, *"Jet-vetoed Higgs cross section in gluon fusion at N3LO+NNLL with small-R resummation"* JHEP 1604 (2016) 049 [arXiv:1511.02886]

F. Caola, K. Melnikov, R. Röntsch and L. Tancredi, *"QCD Corrections to ZZ Production in Gluon Fusion at the LHC"*, Phys. Rev. D92 (2015) 9, 094028 [arXiv:1509.06734]

F. Caola, K. Melnikov and M. Schulze, *"Fiducial cross sections for Higgs boson production in association with a jet at next-to-next-to-leading order in QCD"*, Phys. Rev. D92 (2015) 7, 074032 [arXiv:1508.02684]

R. Boughezal, F. Caola, K. Melnikov, F. Petriello and M. Schulze, *"Higgs Boson Production in Association with a Jet at Next-to-Next-to-Leading Order"*, Phys. Rev. Lett. 115 (2015) 8 [arXiv:1504.07922]

F. Caola, J. M. Henn, K. Melnikov, A. V. Smirnov and V. A. Smirnov, *"Two-loop helicity amplitudes for the production of two off-shell electroweak bosons in gluon fusion"*, JHEP 1506 (2015) 129 [arXiv:1503.08759]

F. Caola, J. M. Henn, K. Melnikov, A. V. Smirnov and V. A. Smirnov, *"Two-loop helicity amplitudes for the production of two off-shell electroweak bosons in quark-antiquark collisions"*, JHEP 1411 (2014) 041 [arXiv:1408.6409]

M. Brucherseifer, F. Caola and K. Melnikov, *"On the NNLO QCD corrections to single-top production at the LHC"*, Phys. Lett. B736 (2014) 58-63 [arXiv:1404.7116]

F. Caola, J. M. Henn, K. Melnikov and V. Smirnov, *"Non-planar master integrals for the production of two off-shell vector bosons in collisions of massless partons"*, JHEP 1409 (2014) 043 [arXiv:1404.5590]

F. Caola, A. Czarnecki, Y. Liang, K. Melnikov and R. Szafron, *"Muon decay spin asymmetry"*, Phys. Rev. D90, 053004 (2014) [arXiv:1403.3386]

I. Anderson, S. Bolognesi, F. Caola, Y. Gao, A. Gritsan, C. Martin, K. Melnikov, M. Schulze, N.V. Tran, A. Whitbeck and Y. Zhou, *"Constraining anomalous HVV interactions at proton and lepton colliders"*, Phys. Rev. D89 035007 (2014) [arXiv:1309.4819]

F. Caola and K. Melnikov, *"Constraining the Higgs boson width with ZZ production at the LHC"*, Phys. Rev. D88, 054024 (2013) [arXiv:1307.4935]

M. Bonvini, F. Caola, K. Melnikov, S. Forte and G. Ridolfi, *"Signal-background interference effects for $gg \to H \to W^+W^-$ beyond leading order"*, Phys. Rev. D 88, 034032 (2013) [arXiv:1304.3053]

R. Boughezal, F. Caola, K. Melnikov, F. Petriello and M. Schulze, *"Higgs boson production in association with a jet at next-to-next-to-leading order in perturbative QCD"*, JHEP 1306 (2013) 072 [arXiv:1302.6216]

M. Brucherseifer, F. Caola and K. Melnikov, *"On the $\mathcal{O}(\alpha_s^2)$ corrections to $b \to X_u e \bar{\nu}$ inclusive decays"*, Phys. Lett. B721 (2013) 107-110 [arXiv:1302.0444]

M. Brucherseifer, F. Caola and K. Melnikov, *"$\mathcal{O}(\alpha_s^2)$ corrections to fully-differential top quark decays"*, JHEP 1304 (2013) 059 [arXiv:1301.7133]

F. Caola, K. Melnikov and M. Schulze, *"A complete next-to-leading order QCD description of resonant Z' production and decay into $t\bar{t}$ final states"*, Phys. Rev. D87 (2013) 3, 034015 [arXiv:1211.6387]

L. Dai, K. Melnikov and F. Caola, *"Tree amplitudes and color decomposition in broken SU(2)"*, JHEP 1204 (2012) 095 [arXiv:1201.1523]

J.M. Campbell, F. Caola, F. Febres Cordero, L. Reina and D. Wackeroth, *"NLO QCD predictions for $W + 1$ jet and $W + 2$ jet production with at least one b jet at the 7 TeV LHC"*, Phys. Rev. D86 (2012) 034021 [arXiv:1107.3714]

F. Caola and S. Marzani, *"Finite fermion mass effects in pseudoscalar Higgs production via gluon-gluon fusion"*, Phys. Lett. B698 (2011) 275-283 [arXiv:1101.3975]

F. Caola, S. Forte and S. Marzani, *"Small x resummation of rapidity distributions: the case of Higgs production"*, Nucl. Phys. B846 (2011) 167-211 [arXiv:1010.2743]

F. Caola, S. Forte and J. Rojo, *"HERA data and DGLAP evolution: Theory and phenomenology"*, Nucl. Phys. A854 (2011) 32-44 [arXiv:1007.5405]

F. Caola, S. Forte and J. Rojo, *"Deviations from NLO QCD evolution in inclusive HERA data"*, Phys. Lett. B686:127-135,2010 [arXiv:0910.3143]

F. Caola and S. Forte, *"Geometric Scaling from Dokshitzer-Gribov-Lipatov-Altarelli-Parisi Evolution"*, Phys. Rev. Lett. 101, 022001 (2008) [arXiv:0802.1878]

Conference Proceedings and Working Group Contributions

"Single top production", in M. L. Mangano et al., *"Physics at a 100 TeV pp collider: Standard Model processes"* [arXiv:1607.01831]

"Higgs plus jet and Higgs p_T spectrum in $gg \to H$", in R. Contino et al, *"Physics at a 100 TeV pp collider: Higgs and EW symmetry breaking studies"* [arXiv:arXiv:1606.09408]

"NNLO corrections for LHC processes", 50th Rencontres de Moriond on QCD and High Energy Interactions, Mar. 2015

R. Boughezal, F. Caola, K. Melnikov, F. Petriello and M. Schulze, *"Higgs+jet at NNLO"*, in *"Handbook of LHC Higgs Cross Sections: 3. Higgs Properties"* [arXiv:1307.1347]

S. Marzani, F. Caola and S. Forte, *"High Energy Resummation for Rapidity Distributions"*, proceedings of the 19th International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS 2011), Newport News, Virginia, 11-15 Apr. 2011 [arXiv:1106.6297]

J. Rojo and F. Caola, *"Parton distributions and small-x QCD at the Large Hadron Electron Collider"*, proceedings of 17th International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS 2009), Madrid, Spain, 26-30 Apr. 2009 [arXiv:0906.2079]

"Parton saturation and geometric scaling", in Z.J. Ajaltouni et al., *"Proceedings of the workshop: HERA and the LHC workshop series on the implications of HERA for LHC physics."*, Mar. 2009 [arXiv:0903.3861]

Teaching Experience

2018: Mathematical Methods for Physics (part II), B.S. level course, Durham University

2017: Relativistic Quantum Mechanics, B.S. level course, Durham University

2016 – 2017: Quantum Electrodynamics, M.S. level course, Durham University

Professional activities

LHC Higgs Cross Section Working Group 1 theory convener

International Advisory Committee, *"Top"* conference series, since 2017

Member of the International Advisory and Steering Board of the *"NNNPDF"* ERC Advanced Grant (2017-2021, PI: Prof. Stefano Forte)

Local Advisory Committee, *"CERN-Fermilab HCP Summer School*, 2017

Organizer, *"High Time for Higher Orders: From Amplitudes to Phenomenology"*, MITP Scientific Program, Mainz, *13-24 Aug. 2018*

Organizer, *"Amplitudes - practical and theoretical developments"*, MITP Scientific Program, Mainz, 6-17 Feb. 2017

Organizer, *"Future challenges for precision QCD"*, IPPP Durham, 25-28 Oct. 2016

2017: Theory convenor, *"gluon fusion subgroup"* of the Higgs Cross Section Working Group

2014-2017: Theory convenor, *"Off-shell subgroup"* of the Higgs Cross Section Working Group

Editor, *"Off-shell Higgs Production and Higgs Interference"*, in *"Handbook of LHC Higgs cross sections: 4. Deciphering the nature of the Higgs sector"*, CERN Yellow Report

Theory convenor, *"Higgs"* working group of the 2017 session of the Les Houches Workshop Series "Physics at TeV Colliders", June 2017

Theory convenor, *"Top session"* of the LHCP2015 Conference, St. Petersburg, Sep. 2015

Convenor, *"Hard QCD session"* of the QCD@LHC 2014 Conference, Suzdal, Aug. 2014

Referee for Physical Review Letters, Physics Letters B, Nuclear Physics B, Physical Review D, Journal of High Energy Physics, European Physical Journal C

Selected Invited Presentations at International Conferences

46th SLAC summer institute, Menlo Park, 2018

53th Rencontres de Moriond, La Thuile, Mar. 2018

Higgs Maxwell Meeting 2018, "Higgs and Einstein", Edinburgh, 2018

The XXVIII International Symposium on Lepton Photon Interactions at High Energies, Guangzhou (CHN), 2017

Gordon Research Conference, "Pushing the Frontiers of Particle Physics During the LHC Run II Era", Hong Kong (CHN), 2017

29th Rencontres de Blois on "Particle Physics and Cosmology", Blois (FR), 2017

Les Rencontres de Physique de la Vallée d'Aoste XXXI, La Thuile, March 2017

Annual Theory Meeting, Durham, December 2016

Higgs Couplings 2016, SLAC, Menlo Park, November 2016

Into the Unknown with LHC13, UK HEP Forum 2016

Higgs Hunting 2016, Paris, Sep. 2016

QCD@LHC 2016, Zurich, Aug. 2016

LHC Run II and the precision frontier, KITP, Santa Barbara, Mar. 2016

Aspen Winter Conferences, Particle Physics on the Verge of Another Discovery?, Aspen, Jan. 2016

LHC Higgs Cross Section Working Group General Assembly, CERN, Jul. 2015

27th Rencontres de Blois, Blois, Jun. 2015

Standard Model at the LHC 2015, Florence, Apr. 2015

50th Rencontres de Moriond, La Thuile, Mar. 2015

ATLAS (N)NLO MC&Tools Workshop, CERN, Dec. 2014

CMS - Single Top Workshop, Naples, Dec. 2014, *Theory overview talk*

KEK Flavor Factory Workshop / Belle II Theory Interface Platform Meeting, KEK, Tsukuba, Oct. 2014

Top2014, Cannes, Sep. 2014, *Single-top theory overview talk*

Topical workshop on top differential distributions, Cannes, Sep. 2014

Annual CMS Germany meeting, Aachen, Sep. 2014, *Theory plenary talk*

Top Quark Physics Day, MIAPP, TU Munich, Aug. 2014

LoopFest XIII, CUNY, Brooklyn, Jun. 2014

Top LHC Working Group Meeting, CERN, May 2014

QCD tools for LHC physics: from 8 to 14 TeV - what's needed and why?, CTEQ workshop, Fermilab, Batavia IL Nov, 2013

EPS-HEP 2013, Stockholm, Jul. 2013

Physics at TeV colliders, Les Houches, Jun. 2013

LoopFest XII, Florida State University, Tallahassee FL, May 2013

Selected Workshops and Research Visits

Amplitudes - practical and theoretical developments, MITP Mainz, Feb. 6-17 2017

LHC Run II and the Precision Frontier, KITP, Santa Barbara, Mar.-Apr. 2016

New Analytic Ideas for Loop Integrands: QCD Meets N=4 Super Yang-Mills, MITP Mainz, Mar. 2016

Higher Orders and Jets for LHC, MITP Mainz, Jul. 2015

Institute for Advanced Study (IAS), Princeton, Jan. 2015

Physics at TeV Colliders, Les Houches Workshop Series, Jun. 2013

Perturbative higher-order effects at work at the LHC, CERN Theory Institute, CERN, Jun.-Jul. 2010

Language Skills

Mother tongue: Italian

Good knowledge of both spoken and written English (TOEFL certification)

Good knowledge of both spoken and written French

Computer Skills

Operating systems: Linux, Mac OS X, Windows

Programming languages: Fortran, C/C++, Mathematica, Maple, Form, LaTeX

Personal interests

Classical music

Contemporary history

Mountaineering