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Emanuele Angelo Bagnaschi

Current position

10/2014-09/2018 **Postdoctoral researcher**, DESY, Hamburg, Germany.

Education

10/2011-09/2014 **Ph.D. in Particle Physics**, Université Paris Diderot, Paris, *Mention très honorable avec les félicitations du jury.*

10/2009-10/2011 **Laurea Magistrale (M. S.) in Physics**, Università degli studi di Milano, Milano, *110/110 cum laude.*

10/2004-10/2009 **Laurea Triennale (B. S.) in Physics**, Università degli studi di Milano, Milano, *110/110 cum laude.*

Doctorate thesis

Title *Precision phenomenology at the LHC and characterization of theoretical uncertainties*

Supervisor Prof. Matteo Cacciari (Université Paris Diderot-Paris 7)

Master thesis

Title *Implementation of the gluon fusion process in the POWHEG framework in the SM and in the MSSM*

Supervisors Prof. Alessandro Vicini (University of Milano) and Prof. Giuseppe Degrossi (University of Rome 3)

Bachelor thesis

Title *Extension of harmonic polylogarithms to the complex plane*

Supervisor Prof. Alessandro Vicini (University of Milano)

Experience

10/2014-09/2018 **Postdoctoral researcher**, DESY, Hamburg, Germany.
Member of theory group under the supervision of Dr. Georg Weiglein.

- 09/2012–12/2012 **Internship**, *Wolfram Research Inc.*, Champaign, IL, USA.
Top-level implementation in Mathematica of Mathieu functions. This internship was organized in the framework of the LHCPhenonet Initial Training Network.
- 2008–2010 **System administrator for the LCM laboratory**, *Department of Physics of the University of Milan*, Milan, Italy.
The Laboratorio Calcolo e Multimedia (LCM) cluster has more than four hundred active users and it is composed of about forty nodes, three servers (for various tasks - NFS server, web server and log server), four firewall/gateway systems and a dedicated batch farm for computing intensive application that I personally built with the collaboration of another staff member and that I maintained alone personally for more than a year. The computing farm, used by members of the Theoretical Physics group, consists of several clients connected in a double gigabit-ethernet/Infiniband network and managed by TORQUE/MAUI. All systems run Debian Linux.
This work was funded by a joint private-public partnership of the Department of Physics and Messagenet (<http://www.messagenet.it/>).
- 07/2010-08/2010 **Summer student**, *CERN*, Geneva, Switzerland.
Automation of CERN accounting data collection for the World Large Computing Grid (WLCG). The task was solved by writing a Python program that interfaced to several database and monitoring systems to collect the data. The latter were in turn presented to the user through a Django-based web interface.

Fellowships

- 2014-2018 **DESY**, Hamburg, Germany.
Fellowship from the B8 project of the SFB676 collaborative research center.
- 2011-2014 **Marie Curie Early Stage Researcher (ESR) doctorate fellowship**.
From the LHCPhenonet European initial training network (<http://www.lhcphenonet.eu/>).

Research areas

- Collider physics.
- Monte Carlo event generators.
- Physics of the Higgs and electroweak sector.
- BSM physics, with special focus on supersymmetric extensions of the SM.
- Global likelihood studies of BSM models.
- Computational physics, with specific interest to high-performance software and technologies for scientific computing.

Student supervision

- 2015 **Gehrlein Julia**, **summer student**, *DESY*, Hamburg, Germany.
Revisiting Higgs production at LEP. Co-supervision with Dr. Georg Weiglein.
- 2017 **Margarita Gavrilova**, **summer student**, *DESY*, Hamburg, Germany.
A re-appraisal of Higgs production in vector boson associated production in the 2HDM. Co-supervision with Dr. Georg Weiglein and Dr. Stefan Liebler.
- 2017 **Roberto Corral Lopez**, **summer student**, *DESY*, Hamburg, Germany.
MSSM Higgs scenarios in light of the current LHC constraints. Co-supervision with Dr. Georg Weiglein and Dr. Stefan Liebler.

Other academic activities

- I presented my scientific activity at 5 seminars in research institutes.
- Reviewer for the European Physical Journal C (EPJC).

Publications

- E. Bagnaschi, G. Degrandi, P. Slavich, and A. Vicini. “Higgs production via gluon fusion in the POWHEG approach in the SM and in the MSSM”. *JHEP*, 1202:088, 2012
- E. Bagnaschi, R.V. Harlander, S. Liebler, H. Mantler, P. Slavich, et al. Towards precise predictions for Higgs-boson production in the MSSM. *JHEP*, 1406:167, 2014
- Emanuele Bagnaschi, Gian F. Giudice, Pietro Slavich, and Alessandro Strumia. Higgs Mass and Unnatural Supersymmetry. *JHEP*, 1409:092, 2014
- Emanuele Bagnaschi, Matteo Cacciari, Alberto Guffanti, and Laura Jenniches. An extensive survey of the estimation of uncertainties from missing higher orders in perturbative calculations. *JHEP*, 02:133, 2015
- K. J. de Vries et al. The pMSSM10 after LHC Run 1. *Eur. Phys. J.*, C75(9):422, 2015
- Emanuele Bagnaschi and Alessandro Vicini. The Higgs transverse momentum distribution in gluon fusion as a multiscale problem. *JHEP*, 01:056, 2016
- E. A. Bagnaschi et al. Supersymmetric Dark Matter after LHC Run 1. *Eur. Phys. J.*, C75:500, 2015
- Emanuele Bagnaschi, Robert V. Harlander, Hendrik Mantler, Alessandro Vicini, and Marius Wiesemann. Resummation ambiguities in the Higgs transverse-momentum spectrum in the Standard Model and beyond. *JHEP*, 01:090, 2016
- Emanuele Bagnaschi, Felix Brümmer, Wilfried Buchmüller, Alexander Voigt, and Georg Weiglein. Vacuum stability and supersymmetry at high scales with two Higgs doublets. *JHEP*, 03:158, 2016
- E. Bagnaschi et al. Likelihood Analysis of Supersymmetric SU(5) GUTs. *Eur. Phys. J.*, C77(2):104, 2017
- E. Bagnaschi et al. Likelihood Analysis of the Minimal AMSB Model. *Eur. Phys. J.*, C77(4):268, 2017
- Emanuele Bagnaschi, Javier Pardo Vega, and Pietro Slavich. Improved determination of the Higgs mass in the MSSM with heavy superpartners. *Eur. Phys. J.*, C77(5):334, 2017
- E. Bagnaschi et al. Likelihood Analysis of the pMSSM11 in Light of LHC 13-TeV Data. *Eur. Phys. J.*, C78(3):256, 2018
- J. C. Costa et al. Likelihood Analysis of the Sub-GUT MSSM in Light of LHC 13-TeV Data. *Eur. Phys. J.*, C78(2):158, 2018
- Jorge Gomes, Isabel Campos, Emanuele Bagnaschi, Mario David, Luis Alves, Joao Martins, Joao Pina, Alvaro Lopez-Garcia, and Pablo Orviz. Enabling rootless Linux Containers in multi-user environments: the udocker tool. *arXiv*, 1711.01758, 2017
- Emanuele Bagnaschi, Fabio Maltoni, Alessandro Vicini, and Marco Zaro. Lepton-pair production in association with a $b\bar{b}$ pair and the determination of the W boson mass. *arXiv*, 1803.04336, 2018

Reports and notes

- S. Dittmaier, S. Dittmaier, C. Mariotti, G. Passarino, R. Tanaka, et al. “Handbook of LHC Higgs Cross Sections: 2. Differential Distributions”. *arXiv*, 1201.3084, 2012
- S. Heinemeyer et al. “Handbook of LHC Higgs Cross Sections: 3. Higgs Properties”. *arXiv*, 1307.1347, 2013

- Emanuele Bagnaschi et al. Benchmark scenarios for low $\tan\beta$ in the MSSM. *LHCHSWG-2015-002*, 2015
- D. de Florian et al. Handbook of LHC Higgs Cross Sections: 4. Deciphering the Nature of the Higgs Sector. *arXiv*, 1610.07922, 2016

Conference proceedings

- E. Bagnaschi and L. Jenniches. Missing higher-order theoretical uncertainties in a Bayesian statistics. *Proceedings, 49th Rencontres de Moriond on QCD and High Energy Interactions*, pages 301–308, 2014
- Emanuele Bagnaschi. Estimation of uncertainties from missing higher orders in perturbative calculations. *Proceedings, 50th Rencontres de Moriond, QCD and high energy interactions*, pages 131–134, 2015
- Emanuele Angelo Bagnaschi. Prospects for SUSY discovery after the LHC Run 1. *PoS*, EPS-HEP2015:183, 2015
- Emanuele Angelo Bagnaschi. Prospects for SUSY dark matter after the LHC Run 1. *PoS*, EPS-HEP2015:411, 2015
- Emanuele Bagnaschi. Matching uncertainties in the prediction of the Higgs boson transverse momentum in the SM and beyond. *PoS*, LHCP2016:077, 2016
- E. Bagnaschi. Low-energy SUSY facing LHC constraints. *Nuovo Cim.*, C40(5):190, 2018

Schools, workshops and conferences

- *Future directions in lattice gauge theory*, CERN, Geneva, Switzerland, 19 July - 13 August, 2010.
- *School of Analytic Computing in Theoretical High Energy Physics*, Atrani, Italy, 6-11 October 2011.
- *Hadron Collider Physics Symposium 2011*, Paris, France, 14-18 November 2011.
- *Think Tank on Physics@LHC: Monte Carlo Event Generators at NLO and Jet Physics*, Sariska, Alwar, Rajasthan, India, 05-09 December 2011.
- *LHCPhenonet Winter School 2012*, Ascona, Switzerland, 22-29 January 2012.
Participation in the student session with a talk titled “Higgs boson production in the POWHEG approach in the SM and in the MSSM”.
- *LHCPhenonet Annual Meeting 2012*, Durham, United Kingdom, 19-22 March 2012.
Contribution with the talk “Higgs boson production in the POWHEG approach in the SM and in the MSSM”.
- *6th LHC Higgs Cross Section Working Group Meeting*, CERN, Switzerland, 24 May - 25 May 2012.
- *Higgs Hunting 2012*, Orsay, France 18-20 July 2012.
Participation in the student session with a talk titled “Developments in Higgs production through gluon fusion in the SM and in MSSM in the POWHEG framework”.
- *LHCPhenonet Mid-Term Meeting 2012*, Ravello, Italy, 16-20 September 2012.
- *Higgs Hunting 2013*, Orsay, France, 25-27 July 2013.
- *LHCPhenonet Summer School 2013*, Cracow, Poland, 07-12 September 2013.
- *GDR Terascale@Annecy*, Annecy, France, 28-30 October 2013.
Theory review talk with the title “Effect of quark masses in gluon fusion processes: a theoretical review”.
- *LHCPhenonet annual meeting 2013*, CERN, Switzerland, 2-5 December 2013.

- *ATLAS Higgs WG (N)NLO MC and Tools Workshop for LHC Run2*, CERN, Switzerland, 16-17 December 2013.
- *Rencontres de Moriond: QCD and High Energy interactions*, La Thuile, Italy, 22-29 March 2014. **Contribution with the talk** “Missing higher order theoretical uncertainties in the Cacciari-Houdeau framework: extension to hadronic observables”.
- *Workshop on the precise Higgs mass calculation in the MSSM*, Munich, Germany, 10-12 April 2014.
- *LHCPhenonet workshop on particle physics*, Paris, France, 4-6 June 2014. **Organizer; contribution with the talk** “QCD theoretical uncertainties in a Bayesian framework”.
- *General Assembly Meeting of LHC Higgs Cross Section Working Group*, CERN, Switzerland, 12-13 June 2014.
- *Higgs Hunting 2014*, Orsay, France 21-23 July 2014.
- *BSM Parameter Fitting Workshop*, DESY, Hamburg, 29-30 September 2014. **Contribution with the talk:** “Characterization of Theoretical Uncertainties in Higgs Phenomenology”.
- *Second workshop on the precise Higgs mass calculation in the MSSM*, DESY, Hamburg, Germany, 20-22 October 2014.
- *Hamburg workshop on Higgs Physics*, DESY, Hamburg, Germany, 22-24 October 2014.
- *Heraeus Seminar: Physics Landscape after the Higgs discovery at the LHC*, Bad Honnef, Germany, 4-7 November 2014. **Contribution with a poster:** “Towards precise predictions for Higgs boson production in the MSSM”
- *Higgs (N)NLO MC and Tools Workshop for LHC RUN-2*, CERN, Switzerland, 17-19 December 2014. **Contribution with the talk:** “Higgs p_T in gluon fusion beyond the Standard Model”.
- *Rencontres de Moriond: QCD and High Energy interactions*, La Thuile, Italy, 21-28 March 2015. **Contribution with the talk:** “Estimation of uncertainties from missing higher orders in perturbative calculations”.
- *3rd KUTS workshop*, LPTHE, Paris, France, 18-20 May 2015.
- *The 10th Workshop of the LHC Higgs Cross Section Working Group*, CERN, Switzerland, 15-17 July 2015. **Contribution with the talk:** “Towards precise predictions for p_T Higgs distributions in BSM physics”.
- *European Physical Society (EPS) conference on High Energy Physics 2015*, Vienna, Austria, 22-29 July 2015. **Contribution with the talks:** “Prospects for SUSY dark matter after the LHC Run 1” and “Prospects for SUSY discovery after the LHC Run 1”.
- *Multi-boson interactions workshop (MBI) 2015*, DESY, Hamburg, Germany, 02-04 September 2015.
- *Theory workshop 2015*, DESY, Hamburg, Germany, 29 September-02 October 2015.
- *2nd Workshop REF 2015 (Resummation, Evolution, Factorization)*, DESY, Hamburg, Germany, 02-03 November 2015. **Invited talk:** “The Higgs transverse momentum in gluon fusion as a multiscale problem: ambiguities and predictions in different p_T -resummation frameworks”.

- *XI ATLAS Italia workshop on Run 2*, Cosenza, Italy, 04-06 November 2015.
Invited talk: “Prospects for BSM Higgs boson phenomenology at Run 2”.
- *Milano Christmas meeting 2015*, Milano, Italy, 21-23 December 2015.
Contribution with the talk: “Higgs mass and unnatural Supersymmetry”.
- *11Th General Assembly Meeting of LHC Higgs Cross Section Working Group*, CERN, Switzerland, 13-15 January 2016.
- *4th KUTS workshop*, Heidelberg, Germany, 20-22 January 2016.
Contribution with the talk: “Heavy SUSY with a light THDM”.
- *Fourth Annual Large Hadron Collider Physics Conference (LHCP2016)*, Lund, Sweden, 13-18 June 2016.
Invited talk: “Resummation ambiguities in the Higgs transverse-momentum spectrum in the Standard Model and beyond”.
- *Theory workshop 2016*, Hamburg, Germany, 27-30 September 2016.
- *Matter and the universe meeting*, Mainz, Germany 12 December 2016.
Contribution with the talk: “Higgs mass computation in BSM”.
- *(Re)interpreting the results of new physics searches at the LHC*, CERN, Switzerland, 13-14 December 2016.
- *Simplified Template Cross-Section (STXS) workshop*, DESY, Hamburg, Germany, 19-21 December 2016.
- *Milano Christmas workshop 2016*, Milano, Italy, 22 December 2016.
Contribution with the talk: “Perspective for Supersymmetry after current LHC runs”.
- *6th KUTS workshop*, Aachen, Germany, 23-25 January 2017.
Contribution with the talk: “Improved estimation of the EFT uncertainty in the determination of the Higgs mass with heavy superpartners”.
- *Les Rencontres de Physique de la Vallée d’Aoste (La Thuile 2017)*, La Thuile, Italy, 05-11 March 2017.
Invited talk: “Low-energy SUSY facing LHC constraints”.
- *29th Rencontres de Blois*, Blois, France, 28 May/2 June 2017.
Invited talk: “Perspectives on the Higgs p_T as a probe of BSM physics”.
- *13Th General Assembly Meeting of LHC Higgs Cross Section Working Group*, CERN, Switzerland, 13-14 July 2017.
- *7th KUTS workshop*, KIT, Karlsruhe, Germany, 17-19 July 2017.
- *QCD@LHC 2017*, Debrecen, Hungary, 28 August/01 September 2017.
Invited talk: “Status of QCD corrections for BSM Higgs physics”.
- *QCD@LHC 2017*, Debrecen, Hungary, 28 August/01 September 2017.
Contribution with the talk: “ $ll\ b\bar{b}$ associated production and its impact on the W mass measurement”.
- *DESY Theory workshop 2017*, Hamburg, Germany, 26-29 September 2017.
- *11th Annual meeting of the Helmholtz Alliance “Physics at the Terascale”*, Hamburg, Germany, 27-29 November 2017.
Contribution with two talks: “Perspectives on the pMSSM11 in light of current LHC results”; “Container technology for phenomenology tools: the udocker middleware suite”.
- *Milano Christmas meeting 2017*, Milano, Italy, 20-22 December 2017.
- *8th KUTS workshop*, LPTHE, Paris, France, 24-26 January 2018.
- *14Th General Assembly Meeting of LHC Higgs Cross Section Working Group*, CERN, Switzerland, 26-27 March 2018.

Languages

Italian	Native speaker.
English	Good knowledge, both written and spoken.
French	Good knowledge, both written and spoken.
German	Basic reading/writing/speaking skills.

Computer skills

Operating systems	Linux (Gentoo, Debian, Fedora), FreeBSD, OpenIndiana/Illumos, Windows.
Programming languages	C, C++, Fortran77/90, Python, Perl (basic knowledge), Common Lisp (basic knowledge), Haskell (basic knowledge), Julia (basic knowledge).
Scripting languages	sh, bash, awk, sed.
Databases	SQLite.
Scientific tools	Mathematica, GiNaC, ROOT, matplotlib.
Text authoring	L ^A T _E X, MS Office, Open Office.
Version control	cvs, svn, git.

Hobbies and interests

Informatics	Open source software development.
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Voluntary experience

Gentoo Linux	Several contributions to the Gentoo project in form ebuilds and eclasses. This experience enriched my knowledge of shell scripting, sed, awk and of the inner working of the Linux toolchain.
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