

UNIVERSITY OF MILAN

Public selection for recruiting 32 tenure track researcher(s) (RTT) for competition sector 02/A2 - Theoretical Physics of Fundamental Interactions, (scientific-disciplinary sector FIS/02 - Theoretical Physics, Mathematical Models and Methods) at the Department of PHYSICS "ALDO PONTREMOLI", (announcement published in Official Gazette - IV, "Serie speciale Concorsi ed Esami.") - Competition code: 5577

Ramon Peter Winterhalder**CURRICULUM VITAE****PERSONAL INFORMATION**

SURNAME	WINTERHALDER
NAME	RAMON PETER
DATE OF BIRTH	23 MAY 1991

QUALIFICATIONS**DEGREES****BSc in Physics (25/09/2014)**

University of Freiburg, Freiburg, Germany

- Thesis title: *Photon induced top quark pair production and dijet production at the LHC*
- Grade: very good (1.1)
- Supervisor: Prof. Dr. Stefan Dittmaier

MSc in Physics (19/09/2017)

University of Freiburg, Freiburg, Germany

- Thesis title: *Approximations for vector-boson scattering at the LHC*
- Grade: very good (1.0)
- Supervisor: Prof. Dr. Stefan Dittmaier

DOCTORAL DEGREE OR EQUIVALENT QUALIFICATION EARNED IN ITALY OR ABROAD / MEDICAL SPECIALISATION DIPLOMA OR EQUIVALENT QUALIFICATION, FOR THE RELEVANT SECTORS, EARNED IN ITALY OR ABROAD

PhD in Physics (24/11/2020)

Heidelberg University, Heidelberg, Germany

- Thesis title: *How to GAN - Novel simulation methods for the LHC*
- Grade: Magna cum laude (very good)
- Supervisor: Prof. Dr. Tilman Plehn

RESEARCH EXPERIENCE OR RESEARCH ACTIVITY

POSTDOCTORAL RESEARCHER, Sep. 2021 - Present

UCLouvain, Louvain-la-Neuve, Belgium

- Development of the ML-based MADNIS framework for improved phase-space integration and event generation within MG5AMC and as a standalone package
- Advisors: Fabio Maltoni & Olivier Mattelaer

POSTDOCTORAL RESEARCHER, Nov. 2020 - Aug. 2021

Karlsruhe Institute of Technology, Karlsruhe, Germany

- Development of ML methods for fast numerical evaluations of multi-loop integrals
- Advisor: Gudrun Heinrich

TEACHING ACTIVITIES AND EXPERIENCE AT ITALIAN OR FOREIGN UNIVERSITIES

TEACHING EXPERIENCE - Lectures

XIV NExT PhD Workshop 2024, Jul. 2024

Abingdon, United Kingdom

- Lecture on *Machine learning methods for new physics searches* (3h)

MCnet Summer School 2024, June 2024

CERN - Geneva, Switzerland

- Tutorial and hands-on session on MadGraph5 (3h)

ErUM-Data-Hub - Active Training Course, Sep. 2023

Meinerzhagen, Germany

- Lecture on *Diffusion and Transformer models* (1.5h)
- Tutorial and hands-on sessions (3h)

MCnet Summer School 2023, Jul. 2023

Durham, United Kingdom

- Lecture on *Machine learning for event generation* (1h)
- Tutorial and hands-on session on MadGraph5 (3h)

KIAS QUC Summer School on A.I. in High Energy Physics, Jul. 2023

Seoul, South Korea

- Lectures on *Modern machine learning for particle physics* (4h)
- Hands-on projects presentation and supervision (3h)

MCnet Summer School 2022, Jun. 2022

Zakopane, Poland

- Lecture on *Machine learning for event generation* (1h)
- Tutorial and hands-on session on MadGraph5 (3h)

CECI HPC Training Session 2021, Nov. 2021

Louvain-la-Neuve, Belgium

- Lecture and hands-on session on *An Introduction to Neural Networks* (3h)

TEACHING EXPERIENCE - Tutorials

Heidelberg University, Heidelberg, Germany

Oct. 2017 - Sep. 2021

- Advanced Quantum Field Theory - Tutor (2021)
- Theoretical Physics I - Head tutor and replacement lecturer (2018)
- Theoretical Physics I - Tutor (2017)

University of Freiburg, Freiburg, Germany

Oct. 2013 - Jul. 2017

- Experimental Physics II - Tutor (2015, 2017)
- Experimental Physics I - Tutor (2013, 2016)

TEACHING EXPERIENCE - Co-Supervision**Sophia Vent, Bologna, Italy**

MSc in Physics, Dec. 2023 - Present

- Project: Symbolic regression and explainable AI for HEP applications

Luca Beccatini, Louvain-la-Neuve, Belgium

PhD and MSc in Physics, Sep. 2022 - Present

- Shared PhD between Bologna and UCLouvain
- PhD Project: ML surrogates for fast event generation
- Master thesis: *Improving MadGraph importance sampling efficiency by using neural network*

Theo Heimel, Heidelberg, Germany

PhD in Physics, Apr. 2021 - Apr. 2024

- Thesis: *The Flow of LHC Events - Generative models for LHC simulations and inference*

Mathias Backes, Heidelberg, Germany

BSc in Physics, Mar. 2020 - Jun. 2020

- Thesis: *How to unweight with GANs*

PROFESSIONAL ACTIVITY AND SERVICE**ACAT 2024, Stony Brook, USA**

Mar. 2024

- Scientific convener responsible for the overall scientific content of the conference, running the abstract review process, and scheduling the plenary speakers

HEP ML Living Review (Online)

May 2023 - Present

- Active moderator of A Living Review of Machine Learning for Particle Physics

Journal Referee (Online)

Jun. 2022 - Present

- Revision of articles for SciPost and European Physical Journal C (EPJ C)

ITP Directors Advisory Board, Heidelberg, Germany

May 2019 - Oct. 2020

- Elected PhD representative

TALKS AT CONFERENCES AND SEMINARS**CONFERENCES AND WORKSHOPS****EuCAIFCon 2024, Amsterdam, Netherlands**

The MadNIS Reloaded - Boosting MadGraph with Neural Importance Sampling

May 2024

COMETA WG2 Meeting (Online)

The MadNIS Reloaded - Enhancing MadGraph with Neural Importance Sampling, invited talk

Mar. 2024

LHC EW WG Meeting (Online)

Like-sign VBS at the LHC - Approximations and full NLO predictions, invited talk
Jan. 2024

Generator and N(n)LO Workshop (Geneva, Switzerland)

The MadNIS Reloaded - Boosting MG5 with Neural Networks, invited talk
Nov. 2023

ML4Jets 2023 (Hamburg, Germany)

Modern Machine Learning for the LHC Simulation Chain, invited plenary talk
Nov. 2023

Hammers & Nails (Locarno, Switzerland)

Modern Machine Learning for the LHC Simulation Chain, invited talk
Nov. 2023

3rd MODE Workshop (Princeton, USA)

MadNIS and ELSA - Multi-modal event generation, invited talk
July 2023

LHCP 2023 (Belgrade, Serbia)

Modern Machine Learning for LHC Physics, invited plenary talk
May 2023

Pheno 2023 (Pittsburgh, USA)

Machine Learning for Particle Physics, invited plenary talk
May 2023

CRC TRR 257 Meeting (Aachen, Germany)

Machine Learning for HEP Theory, invited plenary talk
Mar. 2023

ML Workshop (Heidelberg, Germany)

MadNIS - Neural multi-channel importance sampling in MadGraph, invited talk
Dec. 2022

IML Meeting (Geneva, Switzerland)

MadNIS - Neural networks for multi-channel integration in MadGraph (online)
Dec. 2022

ML4Jets 2022 (Piscataway, USA)

MadNIS - Neural networks for multi-channel integration in MadGraph
Nov. 2022

MCnet Meeting (Graz, Austria)

MadNIS - Neural networks for multi-channel integration in MadGraph, invited Talk
Sep. 2022

IML Meeting (Geneva, Switzerland)

Targeting Multi-Loop Integrals with Neural Networks (online)
May 2022

IRN Meeting (Bonn, Germany)

Targeting Multi-Loop Integrals with Neural Networks, invited talk
Mar. 2022

DPG Spring Meeting (Heidelberg, Germany)

Targeting Multi-Loop Integrals with Neural Networks (online)
Mar. 2022

MadGraph Meeting (Bonn, Germany)

Machine Learning for Event Generation, invited talk
Nov. 2021

ML4Jets 2021 (Heidelberg, Germany)

Latent Space Refinement for Deep Generative Models
Jul. 2021

CRC TRR 257 Meeting (Heidelberg, Germany)

New LHC Simulation Methods (online)
Jun. 2020

IMPRS-PTFS Meeting (Heidelberg, Germany)

New LHC Simulation Methods, invited talk
May 2020

ML4Jets 2020 (New York, USA)

How to GAN LHC Events
Jan. 2020

IMPRS-PTFS Meeting (Neunkirchen, Germany)

How to GAN LHC Events
Sep. 2019

Higgs Couplings 2017 (Heidelberg, Germany)

The Effective-Vector-Boson Approximation at the LHC
Nov. 2017

IMPRS-PTFS Meeting (Karlsruhe, Germany)

Approximations for Vector Boson Scattering at the LHC
Oct. 2017

SEMINARS**CERN QCD Seminar (Geneva, Switzerland)**

Generative Machine Learning - Towards a paradigm shift in physics research?
Jan. 2024

IPA Colloquium (Zurich, Switzerland)

Generative Machine Learning - Towards a paradigm shift in particle physics research?
Dec. 2023

Joint INFN-UNIMI-UNIMIB Seminar (Milan, Italy)

The MadNIS Reloaded
Dec. 2023

IFT Seminar (Madrid, Spain)

The MadNIS Reloaded
Oct. 2023

KIAS QUC-AIHEP Seminar (Seoul, South Korea)

MadNIS - Neural Importance Sampling
Jun. 2023

ODSL Seminar (Munich, Germany)

MadNIS - Neural Importance Sampling (online)

May 2023

IPPP Seminar (Durham, UK)

Targeting Multi-Loop Integrals with Neural Networks (online)

Jun. 2022

TTK Theory Seminar (Aachen, Germany)

Targeting Multi-Loop Integrals with Neural Networks

May 2022

ODSL Seminar (Munich, Germany)

Targeting Multi-Loop Integrals with Neural Networks (online)

Apr. 2023

CP3 Seminar (Louvain-la-Neuve, Belgium)

Unbinned Measurements & Predictions

Oct. 2021

NERSC Data Seminar (Berkeley, USA)

Generative Neural Networks (online)

Oct. 2020

Seminar Fundamentale Wechselwirkungen (Freiburg, Germany)

How to GAN LHC Events

Dec. 2019

ITP Pheno Seminar (Heidelberg, Germany)

Approximations for Vector-Boson Scattering at the LHC

Nov. 2017

FOREIGN LANGUAGES

German - Native

English - C1

Swedish - A2

Italian - A2

French - A1

AWARDS, ACKNOWLEDGEMENTS, SCHOLARSHIPS**HEiKA Fellow**

Joint PostDoc fellowship with Heidelberg University and KIT Karlsruhe

Jan. 2021 - Aug. 2021

IMPRS-PTFS Fellow

PhD fellowship of the International Max Planck Research School in Heidelberg

Oct. 2017 - Sep. 2020

Erasmus Scholar

Erasmus scholarship for one-year studies at Imperial College London

Oct. 2015 - July 2016

Deutschlandstipendium

Scholarship awarded annually to high-achieving students at German universities
Oct. 2014 - Sep. 2017

OTHER INFORMATION**SKILLS**

Programming: Python, C/C++, Fortran

Frameworks: PyTorch, TensorFlow, Keras, MadGraph, Mathematica, ROOT

SCIENTIFIC PRODUCTION**SCIENTIFIC PUBLICATIONS****PEER-REVIEWED ARTICLES****Like-Sign W-Boson Scattering at the LHC - Approximations and Full Next-to-Leading-Order Predictions (2023)**

S. Dittmaier, P. Maierhöfer, C. Schwan, R. Winterhalder
JHEP 11 (2023) 022, arXiv:2308.16716 [hep-ph]

ELSA - Enhanced latent spaces for improved collider simulations (2023)

B. Nachman and R. Winterhalder
Eur. Phys. J. C 83, 843 (2023), arXiv:2305.07696 [hep-ph]

MadNIS - Neural Multi-Channel Importance Sampling (2022)

T. Heimgel, R. Winterhalder, A. Butter, J. Isaacson, C. Krause, F. Maltoni, O. Mattelaer, T. Plehn
SciPost Phys. 15, 141 (2023), arXiv:2212.06172 [hep-ph]

Event Generators for High-Energy Physics Experiments (2022)

J. M. Campbell et al.
SciPost Phys. 16, 130 (2024), arXiv:2203.11110 [hep-ph], contribution to Snowmass 2021

Machine Learning and LHC Event Generation (2022)

A. Butter, T. Plehn, S. Schumann (editors) et al.
SciPost Phys. 14, 079 (2023), arXiv:2203.07460 [hep-ph], contribution to Snowmass 2021

Ephemeral Learning - Augmenting Triggers with Online-Trained Normalizing Flows (2022)

A. Butter, S. Diefenbacher, G. Kasieczka, B. Nachman, T. Plehn, D. Shih, R. Winterhalder
SciPost Phys. 13, 087 (2022), arXiv:2202.09375 [hep-ph]

Targeting Multi-Loop Integrals with Neural Networks (2021)

R. Winterhalder, V. Magerya, E. Villa, S. P. Jones, M. Kerner, A. Butter, G. Heinrich, T. Plehn
SciPost Phys. 12, 129 (2022), arXiv:2112.09145 [hep-ph]

Publishing Unbinned Differential Cross Section Results (2021)

M. Arratia, A. Butter, M. Campanelli, V. Croft, A. Ghosh, D. Gillberg, K. Lohwasser, B. Malaescu, V. Mikuni, B. Nachman, J. Rojo, J. Thaler, R. Winterhalder
JINST 17, P01024 (2022), arXiv:2109.13243 [hep-ph]

How to GAN Event Unweighting (2020)

M. Backes, A. Butter, T. Plehn, R. Winterhalder
SciPost Phys. 10, 089 (2021), arXiv:2012.07873 [hep-ph]

Invertible Networks or Partons to Detector and Back Again (2020)

M. Bellagente, A. Butter, G. Kasieczka, T. Plehn, A. Rousselot,
R. Winterhalder, L. Ardizzone, U. Köthe
SciPost Phys. 9, 074 (2020), arXiv:2006.06685 [hep-ph]

How to GAN Event Subtraction (2019)

A. Butter, T. Plehn, R. Winterhalder
SciPost Phys. Core 3, 009 (2020), arXiv:1912.08824 [hep-ph]

How to GAN away Detector Effects (2019)

M. Bellagente, A. Butter, G. Kasieczka, T. Plehn, R. Winterhalder
SciPost Phys. 8, 070 (2020), arXiv:1912.00477 [hep-ph]

How to GAN LHC Events (2019)

A. Butter, T. Plehn, R. Winterhalder
SciPost Phys. 7, 075 (2019), arXiv:1907.03764 [hep-ph]

PREPRINT ARTICLES**The MadNIS Reloaded (2023)**

T. Heimel, N. Huetsch, F. Maltoni, O. Mattelaer, T. Plehn, R. Winterhalder
arXiv:2311.01548 [hep-ph], accepted by SciPost

Precision-Machine Learning for the Matrix Element Method (2023)

T. Heimel, N. Huetsch, R. Winterhalder, T. Plehn, A. Butter
arXiv:2310.07752 [hep-ph], submitted to SciPost

Latent Space Refinement for Deep Generative Models (2021)

R. Winterhalder, M. Bellagente, B. Nachman
NeurIPS DGMs and Applications Workshop (2021), arXiv:2106.00792 [stat.ML]

LECTURE NOTES**Modern Machine Learning for LHC Physicists (2022)**

T. Plehn, A. Butter, B. Dillon, C. Krause, T. Heimel, R. Winterhalder
arXiv:2211.01421 [hep-ph]

CONFERENCE PROCEEDINGS**Full and approximated NLO predictions for like-sign W-boson scattering at the LHC**

S. Dittmaier, C. Schwan, R. Winterhalder
arXiv:2405.18286 [hep-ph], contribution to LL2024 proceedings

Declarations given in the present curriculum must be considered released according to art. 46 and 47 of DPR n. 445/2000.

The present curriculum does not contain confidential and legal information according to art. 4, paragraph 1, points d) and e) of D.Lgs. 30.06.2003 n. 196.

Date

18/07/2024

Place

Ixelles