

Curriculum Vitæ

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Philipp M. Schicho



1. Personal information

name Dr. Philipp Maximilian Schicho
born in Graz, Austria, 01 October 1991

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2. Current position

05/2020 – 08/2022 Postdoctoral researcher
University of Helsinki, Helsinki Institute of Physics
Advisors: Aleksi Vuorinen, Kari Rummukainen
Research: Thermal field theory and particle cosmology

3. Employment history

02/2017 – 04/2020 Doctor of Philosophy, PhD Physics (magna cum laude), 23/04/2020
AEC, Institute for Theoretical Physics, University of Bern
Major: Thermal field theory and particle cosmology
Advisor: Mikko Laine
Thesis: *Multi-loop investigations of strong interactions at high temperatures*, (cf. research output [4]).

10/2016 – 01/2017 Technical student
CERN, Accelerator and Beam Transfer, Beam Transfer Physics
Theoretical optimisation of slow extraction (cf. research output [6]).
Advisors: Matthew A. Fraser, Malika Meddahi

- 06/2015 – 08/2015 Summer student
CERN, ABT, BTP
Thesis: *Optimising simulation times of SPS slow extraction using MAD-X*, (cf. research output [5]).
- 07/2014 – 08/2014 Summer student (grade: 1.0/1.0)
HEPHY, Institute of High Energy Physics, Vienna
Advisor: Robert Schöffbeck
Thesis: *Increasing the sensitivity of a search for supersymmetry in the single lepton channel with the Transverse Mass M_{T2} (CMS)*, (cf. research output [1]).

4. Education

- 07/2017 École de physique des Houches
Effective Field Theory (EFT) in particle physics and cosmology
Introduction to EFT to describe multi-scale quantum systems in a tractable fashion. EFT allows to concisely parametrise possible new physics beyond established models such as the Standard Model of particle physics and cosmology.
- 03/2017 Computer algebra and particle physics (CAPP) school, DESY, Hamburg
Topics at the interface of modern computer algebra and particle physics such as Feynman integrals and multi-loop techniques.
- 09/2014 – 11/2016 Master of Science, MSc Physics (grade: 5.5/6.0), 01/11/2016
ETH Zürich, Switzerland
Major: Theoretical high energy physics, lattice QCD, applied mathematics
Advisor: Philippe de Forcrand
Thesis: *Inhomogeneous condensation in quark-based QCD effective models via wavelet pseudoparticles*, (cf. research output [3]).
- 07/2014 Summer School in Particle and Astroparticle physics
LAPP Annecy-le-Vieux, France
- 09/2011 – 08/2014 Bachelor of Science, BSc Physics (with distinction, 1.1/1.0), 12/08/2014
Graz University of Technology, Austria
Advisors: H. G. Evertz, C. B. Lang
Thesis: *π - and ρ -Meson mass spectroscopy from Lattice QCD*, (cf. research output [2]).
- 08/2013 Summer school, University of Utrecht, Netherlands
Theoretical topics on thermal and statistical physics, quantum mechanics, electrodynamics, condensed matter, high energy physics and quantum gravity.
- 09/2002 – 05/2010 Österreichische Reifeprüfung, Matura (with distinction, 1.0/1.0)
AHS BG/BRG Leibnitz, Austria

Major: Physics and geometry

Advisor: Hermann Scherz

Thesis: *Sonoluminescence – A bubble’s enlightenment*. A theoretical and experimental approach to the effect of Sonoluminescence.

5. Teaching activities

- 03/2022 School tutor, Galileo Galilei Institute for Theoretical Physics
Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation
Phase transitions in the early universe
- 2021– MSc thesis supervisor, University of Helsinki, Helsinki Institute of Physics
Sami Vihko, 06/2021 – 03/2022, co-supervised with Aleksi Vuorinen
Thesis: *EFT methods and calculational techniques in imaginary time formalism of thermal QCD*.
- 02/2017 – 02/2020 Teaching assistant, AEC, Institute for Theoretical Physics, University of Bern
Lecturing, designing and grading exercises and exams at Bachelor and Master level.
Quantum theory I/II, the Standard Model, statistical mechanics, introduction to BSM physics, theoretical exercises
References: Thomas Becher, Susanne Reffert, Rakhi Mahbubani
- 02/2015 – 05/2016 Teaching assistant, ETH Zürich, D-MATH/D-PHYS
Numerical mathematics I, Numerical methods, Physics I
References: Christoph Schwab, Sandra May, Andreas Vaterlaus
- 2013 – 2014 Teaching assistant, Graz University of Technology, ITP/IEP
Theoretical mechanics, physics laboratory I/II
References: W. v. d. Linden, Enrico Arrigoni

6. Outreach

- 09/2017 Public research display, University of Bern
Nacht der Forschung (NdF)

7. Research visits

- 10/2021 University of Basel; Stefan Antusch
- 10/2021 University of Bern, AEC, Institute for Theoretical Physics; Mikko Laine
- 08/2019 University of Helsinki, Helsinki Institute of Physics; Aleksi Vuorinen, Kari Rummukainen

08/2018 Universidad del Bío-Bío, Grupo de Cosmología y Partículas Elementales; York Schröder

8. Scientific research skills

Theoretical (Dimensionally reduced) effective field theories, thermal field theory, quantum field theory, Lattice QCD, simulations in physics, computer algebra techniques, general relativity, cosmology, string theory, conformal field theory, group theory

Computational C/C++, Python, Matlab, FORM, ROOT, FORTRAN 77, Unix, Linux, Mathematica, LaTeX, computer hardware, HTML, Office, CAD-Software

9. Prizes, awards, fellowships

2011 – 2014 Scholarship of excellence Graz University of Technology
(EUR 800 scholarship p.a.)

10. Languages

German Mother-tongue

English Proficient C2, TOEFL 106/120 (2014), Cambridge ESOL B2 First FCE (2010)

Spanish Intermediate B1

Danish Elementary A2

French Beginner A1

Latin Very good (literal translation)

Research output list

Journal articles

- [15] **P. Schicho**, T. V. I. Tenkanen, and G. White, *Combining thermal resummation and gauge invariance for electroweak phase transition*, (2022), [2203.04284].
- [14] J. Ghiglieri, G. D. Moore, **P. Schicho**, and N. Schlusser, *The force-force-correlator in hot QCD perturbatively and from the lattice*, JHEP **02**, 58 (2022), [2112.01407].
- [13] J. Hirvonen, J. Löfgren, M. J. Ramsey-Musolf, **P. Schicho**, and T. V. I. Tenkanen, *Computing the gauge-invariant bubble nucleation rate in finite temperature effective field theory*, (2021), [2112.08912].
- [12] J. Löfgren, M. J. Ramsey-Musolf, **P. Schicho**, and T. V. I. Tenkanen, *Nucleation at finite temperature: a gauge-invariant, perturbative framework*, (2021), [2112.05472].
- [11] L. Niemi, **P. Schicho**, and T. V. I. Tenkanen, *Singlet-assisted electroweak phase transition at two loops*, Phys. Rev. D **103**, 115035 (2021), [2103.07467].
- [10] D. Croon, O. Gould, **P. Schicho**, T. V. I. Tenkanen, and G. White, *Theoretical uncertainties for cosmological first-order phase transitions*, JHEP **04**, 055 (2021), [2009.10080].
- [9] **P. M. Schicho**, T. V. I. Tenkanen, and J. Österman, *Robust approach to thermal resummation: Standard Model meets a singlet*, JHEP **06**, 130 (2021), [2102.11145].
- [8] M. Laine, **P. Schicho**, and Y. Schröder, *A QCD Debye mass in a broad temperature range*, Phys. Rev. D **101**, 023532 (2020), [1911.09123].
- [7] M. Laine, **P. Schicho**, and Y. Schröder, *Soft thermal contributions to 3-loop gauge coupling*, JHEP **2018**, 37 (2018), [1803.08689].

Conference proceedings

- [6] M. Fraser, D. Björkman, K. Cornelis, B. Goddard, V. Kain, **P. Schicho**, C. Theis, and H. Vincke. *Modelling the Radioactivity Induced by Slow-Extraction Losses in the CERN SPS*. In *Proc. of International Particle Accelerator Conference (IPAC'17)* (May 2017), 1897–1900.
- [5] M. A. Fraser, R. G. Alia, B. Balhan, H. Bartosik, C. Bertone, D. Björkman, J. Borburgh, N. Conan, K. Cornelis, L. Gatignon, B. Goddard, Y. Kadi, V. Kain, A. Mereghetti, F. Roncarolo, **P. M. Schicho**, J. Spanggaard, O. Stein, L. Stoel, F. M. Velotti, and H. Vincke. *SPS Slow Extraction Losses and Activation: Challenges and Possibilities for Improvement*. In *Proc. of International Particle Accelerator Conference (IPAC'17)* (Copenhagen. 2017), 611–614.

Theses

- [4] **P. M. Schicho**, *Multi-loop investigations of strong interactions at high temperatures*, PhD thesis (U. Bern, 2020).
- [3] **P. M. Schicho**, *Inhomogeneous condensation in quark-based QCD effective models via wavelet pseudoparticles*, MA thesis (ETH Zürich, 2016).
- [2] **P. Schicho**, *π - and ρ -Meson mass spectroscopy from Lattice QCD*, BA thesis (TU Graz, 2014).
- [1] **P. Schicho**, *Increasing the sensitivity of a search for supersymmetry in the single lepton channel with the Transverse Mass*, Project thesis (HEPHY Vienna, 2014).

Seminar and contributed talks

- 03/03/2022 *Effective theory approach to cosmological phase transitions*, invited seminar talk at Instituto de Astrofísica de Canarias, La Laguna, Spain
- 28/10/2021 *Gauge independent bubble nucleation rate at finite temperature*, invited seminar talk at University of Basel, Basel, Switzerland
- 19/10/2021 *Cosmological phase transition: Robust thermal resummation*, invited seminar talk at University of Bern, Bern, Switzerland
- 13/05/2021 *Cosmological phase transition: Robust thermal resummation*, invited seminar talk at KIAS (online), Seoul, South Korea
- 29/03/2021 *Soft thermal contributions to 3-loop gauge coupling*, contributed parallel talk at FunQCD (online), Barcelona, Spain
- 25/11/2020 *How to be precise at the electroweak scale at finite-temperature*, invited seminar talk at Kavli IPMU (online), Tokyo, Japan
- 13/08/2019 *3-Loop Gauge Coupling in Hot Yang-Mills*, invited seminar talk at Helsinki Institute of Physics, Helsinki, Finland
- 28/08/2018 *Fun with thermal dimension-six operators*, invited seminar talk at Universidad del Bío-Bío, Chillán, Chile
- 28/06/2018 *Fun with thermal dimension-six operators*, contributed parallel talk at SEWM 2018, Barcelona, Spain