Jaco ter Hoeve

PhD candidate, VU Amsterdam and Nikhef
InspireHEP

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Keywords: Standard Model Effective Field Theory, Deep Learning, Likelihood Free Inference, Perturbative QCD

Education

- **VU Amsterdam** — Amsterdam, The Netherlands
  PhD candidate — *since Oct 2020*
  - PhD candidate in Theoretical Particle Physics at VU Amsterdam and Nikhef
    Advisors: Juan Rojo, Wouter Verkerke
- **Utrecht University** — Utrecht, The Netherlands
  M.Sc. Theoretical Physics — *Sep 2018 - Jul 2020*
  - Thesis on 'Matching between EFT and UV Complete Models' at Nikhef
    Graded 8.5/10.0
- **Utrecht University** — Utrecht, The Netherlands
  B.Sc. Physics & Astronomy — *Sep 2015 - Jun 2018*
  - Graduated cum laude, GPA 4.0/4.0 (Dutch grading system: 8.75/10.0)
  - Thesis on 'Renormalization Group Connected to Neural Networks' at the Institute of Theoretical Physics (Utrecht)
  - Participated in the Honours Programme (Descartes College)
- **University of Edinburgh** — Edinburgh, United Kingdom
  Exchange programme — *Sep 2017 - Dec 2017*
  - Obtained an average grade of 80 %, 1st Class Honours

Publications

- J. ter Hoeve, E. Laenen, C. Marinissen, L. Vernazza, G. Wang. *Region analysis of QED massive fermion form factor*, arXiv:2311.16215
- J. ter Hoeve, G. Magni, J. Rojo, A. N. Rossia, E. Vryonidou. *The automation of SMEFT-Assisted Constraints on UV-Complete Models*, JHEP (under review), arXiv:2309.04523
- H. La, A. Brokkelkamp, S. van der Lippe, J. ter Hoeve, J. Rojo, and S. Conesa-Boj. *Edge-Induced Excitations in Bi_2Te_3 from Spatially-Resolved Electron Energy-Gain Spectroscopy*, Ultramicroscopy 254 (2023) 113841, arXiv:2305.03752
- R. G. Ambrosio, J. ter Hoeve , M. Madigan, J. Rojo, and V. Sanz. *Unbinned multivariate observables for global SMEFT analyses from machine learning.* JHEP 03 (2023), arXiv:2211.02058
- A. Brokkelkamp, J. ter Hoeve , I. Postmes, S. E. van Heijst, L. Maduro, A. V. Davydov, S. Krylyuk, J. Rojo, and S. Conesa-Boj. *Spatially-Resolved Band Gap and Dielectric Function in 2D Materials from Electron Energy Loss Spectroscopy.* J. Phys. Chem. A, 126 (2022) 1255, arXiv:2202.12572

Software packages

- `ML4EFT`, likelihood-free inference tool based on deep-learning for particle physics data
  `lhcfitnikhef.github.io/ML4EFT` (open source)
- `EELSFitter`, an Electron-Energy Loss Spectra analyser
  `lhcfitnikhef.github.io/EELSfitter` (open source)
- `SMEFiT`, a standard model effective field theory fitter
  `lhcfitnikhef.github.io/smefit_release` (open source)

Activities

- **NNV subatomic physics council member**
  National Physics Society *since Jun 2022*
- **Chairman DRSTP PhD council**
  Dutch Research School for Theoretical Physics *since Dec 2020*
  - Organise scientific meetings and social/outreach events for theoretical physics PhD students in The Netherlands
- **PhysTev Les Houches workshop** Les Houches, France
  International workshop aiming to push the frontier of particle physics *June 2023*
- **CERN Masterclass** Nikhef
  Particle Physics outreach to high school students *March 2022*
- **Invited guest lecture** TU Delft
  Topic: Electron Energy Loss Fitter with Machine Learning *May 2021*
- **Advanced VBS Traning School** Milan
  Topics: polarised vector boson scattering and effective field theories *Aug 29-Sep 03, 2021*
- **DESY Summer School in Gauge and String Theory** Hamburg
  Topics: scattering amplitudes and loop level technologies *Jul 22-26, 2019*
- **Summer School Programming** Amsterdam
  Developed the game Hex in C++ *Summer 2015*

Teaching and supervisory experience

- **Master thesis supervision** joint UvA/VU
  P. Herbschleb, MSc Theoretical Physics, optimal observables in SMEFT *Sep 22- Jun 23*
- **Bachelor thesis supervision** joint UvA/VU
  W. Gauthier (2023), J. Bakker and D. Pelan (2021), BSc Physics & Astronomy
- **Teaching Assistant** joint UvA/VU
  Courses: *since Sep 2020*
  - Effective Field Theories (2023)
  - Quantum Mechanics II (2021, 2022)

- **Teaching Assistant** — Utrecht University
  Courses: — *Nov 2016 - Jun 2020*
  - Black Holes (2019, 2020)
  - Fluid Dynamics (2018, 2020)
  - Data Analysis (2016, 2017)

Talks at international conferences and workshops

- *Machine Learning opportunities for EFT analyses*, invited talk at the LHC EFT Working Group, CERN (online), October 2023, (slides), (recording)
- *Likelihood learning theory in practice*, invited talk at the LHC Precision Program, Benasque (Spain), October 2023, (slides)
- *Interpreting HEP data in SMEFiT*, invited talk at the Reinterpretation Forum, Durham, August 2023, (slides)
- *Statistically optimal observables for global SMEFT fits*, HEFT, Manchester, June 2023, (slides)
- *Unbinned multivariate observables for global SMEFT analyses from machine learning*, invited talk at CERN, Geneva, December 2022, (slides)
- *Towards an optimal global SMEFT fit with machine learning*, Machine Learning at GGI, Florence, September 2022, (slides)
- *Unbinned measurements in global SMEFT fits from machine learning*, Learning to Discover, Paris-Saclay, May 2022, (slides)
- *Charting Electron Energy Loss Spectra with Machine Learning*, Physics@Veldhoven 2021, January 2022
- *Optimally sensitive observables for global EFT fits*, Dutch Physics Society (NNV) annual meeting, November 2021, (slides)
- *Optimally sensitive observables for global EFT fits*, Higgs 2021, Stony Brook University (online), October 2021, (slides)

Computer and natural languages

- Python, PyTorch, C++, Java, Mathematica, LaTeX, HTML and CSS
- Dutch (Native), English (Full professional proficiency), French (Limited working proficiency)