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frankpeterschilling

Prof. Dr. Frank-Peter Schilling

Career

2023- **Deputy Director**, *Centre for AI (CAI), ZHAW*, Winterthur (CH)

2022- **Adjunct Professor of Data Science**, *Victoria University of Wellington*, Wellington (NZ)

2022- **Senior Lecturer & Group Leader**, *ZHAW*, Winterthur (CH)
Head, Intelligent Vision Systems (IVS) group, Centre for AI (CAI); Computer Vision and MLOps

2019-2022 **Senior Researcher**, *ZHAW*, Winterthur (CH)
Centre for AI (CAI, 2021-); Inst. for Applied Information Technology (InIT, 2019-2021); AI and Deep Learning

2018-2019 **Guest Scientist**, *Zurich University of Applied Sciences ZHAW*, Winterthur (CH)
Institute for Applied Information Technology (InIT); AI/ML, Deep Learning, Computer Vision

2016-2018 **CEO**, *fp solutions*, Bern and Winterthur (CH)

2007-2015 **Visiting Reseacher**, *CERN*, Geneva (CH)
Permanently delegated from KIT to conduct research at CMS experiment at the LHC

2007-2014 **Senior Research Scientist**, *Karlsruhe Institute of Technology KIT*, Karlsruhe (DE)
Research at the CMS experiment at the Large Hadron Collider LHC

2004-2006 **Research Fellow**, *CERN*, Geneva (CH)
Preparatory work for the LHC and the CMS experiment

2001-2004 **Postdoctoral Fellow**, *DESY*, Hamburg (DE)
Research and data analysis at the H1 experiment at the HERA particle accelerator

Education

2023-2024 **Certificate of Advanced Studies (CAS), University Didactics**, *PH Zurich*

2015 **IPMA Certification in Project Management**, *VZPM*

1998-2001 **PhD in Physics (Dr. rer. nat.)**, *University of Heidelberg (DE)*

1992-1998 **Diploma in Physics (MSc equiv.)**, *University of Heidelberg (DE)*

Awards, Publications

2013 **EPS HEP Prize**, *as member of CMS collaboration at CERN, for the discovery of the Higgs boson*

1998- **More than 450 scientific publications, h-index of 150**
For details, see https://fpschill.github.io/publications/

Research Grants and Scholarships

2022 "certAInty", Innosuisse with CertX AG, 600 KCHF

2022 "OSR4H", with Roche Diagnostics, 30 KCHF

2021 "AC3T", Innosuisse with Varian Medical Systems, 785 KCHF

2020 "ANNPR 2020", ZHAW Digital Futures Fund, 10 KCHF

2007-2014 Contributor to several research grants for MEUR research group funding with the German BMBF

2004 EU Marie-Curie Intra-European Fellowship with Univ. Birmingham (UK), declined

Project Management

2019- **Project manager**, *Applied Deep Learning*, ZHAW CAI
Project management for various 3rd party funded research projects in the domain of AI, Deep Learning, Computer Vision and MLOps; Financial planning and reporting; IP contracts

2010-2011 **Programme coordinator "Top Quark Physics"**, *CMS experiment*, CERN
Led one out of seven physics working groups (>100 members) of the word-wide CMS collaboration (matrix organization); responsible for planning and execution of the analysis of the first LHC data; goals and requirements; schedules and resources planning; evaluation and quality control; author and reviewer of publications and technical reports; reporting to management

Research Infrastructure

2023- **Expert group member**, *Data Ethics, Big Data & AI, data innovation alliance*

2022- **Coordinator**, *PhD Programme in Data Science between ZHAW and University of Zurich*

2022- **Head of Studies**, *Continuing Education, ZHAW Centre for AI*

2019- **Advisory board member**, *Breakout group DIZH fellowships*, ZHAW digital

2011-2014 **Co-founder**, *WG on Top Quark Physics at LHC*, LHC Physics Center at CERN (LPCC)
Transnational group of experts discussing scientific topics at the forefront of research in top quark physics

2008-2014 **Coordinator**, *Top Quark Physics WG*, Helmholtz Alliance *Physics at the Terascale*
The "Terascale" Alliance bundles German activities in the field of high-energy collider physics.

2008-2012 **Advisory board member**, *DESY scientific board (DESY WA)*, DESY
DESY WA is a committee which advises the DESY directorate in matters of research policy

Workshop and Conference Organization

2021 ISSDS 2021, Intl. Symposium on the Science of Data Science, ZHAW/Online (co-organizer)

2020 ANNPR 2020, 9th IAPR Workshop on Artificial NN's in Pattern Recognition, ZHAW/Online (chair)

2011, 2012 Helmholtz Alliance workshops on top quark physics, Wuppertal and Berlin (co-organizer)

2011 TOP 2011, 4th Intl. workshop on top quark physics, Sant Feliu de Guixols (IAC member)

Recent Teaching & Student supervision

Head of studies

2023- Creation of new modules: MLOps, Computer Vision with Deep Learning, Generative AI in Teaching, CAS Advanced ML and MLOps

2022- Head of studies: MLOps, Computer Vision with Deep Learning, Generative AI in Teaching, CAS Advanced ML and MLOps, CAS Machine Intelligence

Teaching

2024- "MLOps" (BSc), ZHAW, Spring 2024

2024- "Computer Vision with Deep Learning" (BSc), ZHAW, Spring 2024

2022- "Deep Learning" (CAS Machine Intelligence), ZHAW, Fall 2022, 2023

2019- "Artificial Intelligence 1" (BSc), ZHAW, Fall 2019, 2020, 2021, 2022

2019 "Machine Intelligence Lab" and "AI Seminar" (MSc), ZHAW, Fall 2019

Student supervision

2001- Supervision of 10 PhD students (AI/ML, computer vision; QCD, Top quark and Higgs physics)

2021- Supervision of several MSc/MAS students (AI/ML, computer vision)

Networks

data innovation alliance, European Physical Society (EPS), German Physical Society (DPG), CLAIRE, ELLIS (supporter), ZHAW Datalab, ZHAW Digital Futures Lab, ZHAW Digital Health Lab

Journals

Reviewer/PC member for EPIA 2022, CVPR 2022, AutoML 2022, ANNPR 2022, ISSDS 2021, ANNPR 2020

Reviewer/Guest Editor for MDPI (several), Phys.Lett.B, Eur.Phys.J. C, JHEP, Int.J.Mod.Phys. A

Languages

German (native); English (business fluent); French (very good)

Selected Publications

As of March 2024, my **h-index is ca. 150**. The following list contains **only my most important publications**. For a **full list** of my publications, see Google Scholar: https://scholar.google.com/citations?user=ZgO3g3QAAAAJ.

1. M. Amirian, D. Barco, I. Herzig, and F.-P. Schilling, "Artifact Reduction in 3D and 4D Cone-beam Computed Tomography Images with Deep Learning - A Review," *IEEE Access*, vol. 12, pp. 10 281–10 295, 2024. doi: 10.1109/ACCESS.2024.3353195

2. P. Denzel, S. Brunner, P.-P. Luley, C. Frischknecht-Gruber, M. U. Reif, F.-P. Schilling, A. Amini, M. Repetto, A. Iranfar, J. Weng, and R. Chavarriaga, "A framework for assessing and certifying explainability of health-oriented AI systems," in *Explainable AI in Medicine Workshop, Lugano, Switzerland, November 2023*, 2023. [Online]. Available: `https://digitalcollection.zhaw.ch/handle/11475/29258`

3. P. Denzel, F.-P. Schilling, and E. Gavagnin, "Map-to-map translation for SKA mock observations and cosmological simulations," in *Hammers and Nails 2023 - Swiss Edition, Ascona, Switzerland, October 2023*, 2023. doi: 10.21256/zhaw-29047

4. M. Amirian, J. A. Montoya-Zegarra, I. Herzig, P. E. Hotz, L. Lichtensteiger, M. Morf, A. Züst, P. Paysan, I. Peterlik, S. Scheib, R. M. Füchslin, T. Stadelmann, and F.-P. Schilling, "Mitigation of motion-induced artefacts in Cone Beam Computed Tomography using Deep Convolutional Neural Networks," *Med. Phys.*, vol. 50, no. 10, pp. 6228–6242, 2023. doi: 10.1002/mp.16405

5. F.-P. Schilling, D. Flumini, R. M. Füchslin, E. Gavagnin, A. Geller, S. Quarteroni, and T. Stadelmann, "Foundations of Data Science: A Comprehensive Overview Formed at the 1st International Symposium on the Science of Data Science," *Archives of Data Science, Series A*, vol. 8, no. 2, pp. 1 – 20, 2022. doi: 10.5445/IR/1000146422

6. I. Herzig, P. Paysan, S. Scheib, F.-P. Schilling, J. Montoya, M. Amirian, T. Stadelmann, P. Eggenberger, R. M. Füchslin, and L. Lichtensteiger, "Deep Learning-Based Simultaneous Multi-Phase Deformable Image Registration of Sparse 4D-CBCT," in *Proceedings of the American Association of Physics in Medicine Annual Meeting (AAPM 2022)*, 2022. doi: 10.21256/zhaw-25181 Washington, DC, USA, July 2022

7. N. Simmler, P. Sager, P. Andermatt, R. Chavarriaga, F.-P. Schilling, M. Rosenthal, and T. Stadelmann, "A survey of un-, weakly-, and semi-supervised learning methods for noisy, missing and partial labels in industrial vision applications," in *8th Swiss Conference on Data Science (SDS)*, 2021. doi: 10.1109/SDS51136.2021.00012 pp. 26–31

8. L. Tuggener, M. Amirian, F. Benites, P. von Däniken, P. Gupta, F.-P. Schilling, and T. Stadelmann, "Design Patterns for Resource-Constrained Automated Deep-Learning Methods," *AI*, vol. 1, no. 4, pp. 510–538, 2020. doi: 10.3390/ai1040031

9. F.-P. Schilling and T. Stadelmann, Eds., *Artificial neural networks in pattern recognition : Proceedings of the 9th IAPR TC3 workshop, ANNPR 2020, Winterthur, Switzerland, September 2-4, 2020*, vol. Lecture Notes in Computer Science, no. 12294. Springer, 2020. doi: 10.1007/978-3-030-58309-5

10. M. Amirian, L. Tuggener, R. Chavarriaga, Y. P. Satyawan, F.-P. Schilling, F. Schwenker, and T. Stadelmann, "Two to trust: Automl for safe modelling and interpretable deep learning for robustness," *Proc. of the 1st TAILOR Workshop on Trustworthy AI at ECAI 2020*, 2020. doi: 10.21256/zhaw-22061

11. M. Amirian, K. Rombach, L. Tuggener, F.-P. Schilling, and T. Stadelmann, "Efficient deep cnns for cross-modal automated computer vision under time and space constraints," *Proc. of ECML-PKDD 2019, Würzburg*, 2019. doi: 10.21256/zhaw-18357

12. S. Chatrchyan *et al.*, "Measurement of the mass difference between top quark and antiquark in pp collisions at $\sqrt{s} = 8$ TeV," *Phys. Lett. B*, vol. 770, pp. 50–71, 2017. doi: 10.1016/j.physletb.2017.04.028

13. S. Chatrchyan *et al.*, "Evidence for the direct decay of the 125 GeV Higgs boson to fermions," *Nature Phys.*, vol. 10, p. 557, 2014. doi: 10.1038/nphys3005

14. S. Chatrchyan *et al.*, "Search for the standard model Higgs boson produced in association with a W or a Z boson and decaying to bottom quarks," *Phys. Rev.*, vol. D89, p. 012003, 2014. doi: 10.1103/PhysRevD.89.012003

15. S. Chatrchyan *et al.*, "Observation of a new boson with mass near 125 GeV in pp collisions at $\sqrt{s} = 7$ and 8 TeV," *JHEP*, vol. 1306, p. 081, 2013. doi: 10.1007/JHEP06(2013)081

16. S. Chatrchyan *et al.*, "Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC," *Phys.Lett.*, vol. B716, pp. 30–61, 2012. doi: 10.1016/j.physletb.2012.08.021

17. F.-P. Schilling, "Top Quark Physics at the LHC: A Review of the First Two Years," *Int. J. Mod. Phys.*, vol. A27, no. 17, p. 1230016, 2012. doi: 10.1142/s0217751x12300165

18. S. Chatrchyan *et al.*, "Measurement of the single-top-quark t-channel cross section in pp collisions at $\sqrt{s} = 7$ TeV," *JHEP*, vol. 1212, p. 035, 2012. doi: 10.1007/JHEP12(2012)035

19. S. Chatrchyan *et al.*, "Inclusive and differential measurements of the $t\bar{t}$ charge asymmetry in proton-proton collisions at 7 TeV," *Phys.Lett.*, vol. B717, pp. 129–150, 2012. doi: 10.1016/j.physletb.2012.09.028

20. S. Chatrchyan *et al.*, "Measurement of the $t\bar{t}$ Production Cross Section in pp Collisions at 7 TeV in Lepton + Jets Events Using b-quark Jet Identification," *Phys.Rev.*, vol. D84, p. 092004, 2011. doi: 10.1103/PhysRevD.84.092004

21. S. Chatrchyan *et al.*, "Measurement of the t t-bar production cross section and the top quark mass in the dilepton channel in pp collisions at sqrt(s) =7 TeV," *JHEP*, vol. 07, p. 049, 2011. doi: 10.1007/JHEP07(2011)049

22. S. Chatrchyan *et al.*, "Measurement of the Top-antitop Production Cross Section in pp Collisions at sqrt(s)=7 TeV using the Kinematic Properties of Events with Leptons and Jets," *Eur. Phys. J.*, vol. C71, p. 1721, 2011. doi: 10.1140/epjc/s10052-011-1721-3

23. V. Khachatryan *et al.*, "First Measurement of the Cross Section for Top-Quark Pair Production in Proton-Proton Collisions at $\sqrt{s} = 7$ TeV," *Phys.Lett.*, vol. B695, pp. 424–443, 2011. doi: 10.1016/j.physletb.2010.11.058

24. F.-P. Schilling, "Top Quark Studies with the first CMS Data," in *21st Hadron Collider Physics Symposium, Toronto, Canada*, 2010. doi: 10.48550/arXiv.1010.2393 arXiv:1010.2393

25. F.-P. Schilling, "QCD and Top Quark Physics at the LHC," in *4th Intl. Conference on Physics at the LHC, Split, Croatia*, vol. LHC2008, 2008. doi: 10.22323/1.055.0047 p. 047

26. R. Adolphi *et al.*, "The CMS experiment at the CERN LHC," *JINST*, vol. 3, p. S08004, 2008. doi: 10.1088/1748-0221/3/08/S08004

27. G. Bayatian *et al.*, "CMS technical design report, volume II: Physics performance," *J. Phys.*, vol. G34, pp. 995–1579, 2007. doi: 10.1088/0954-3899/34/6/S01

28. A. Aktas *et al.*, "Measurement and QCD analysis of the diffractive deep- inelastic scattering cross-section at HERA," *Eur. Phys. J.*, vol. C48, pp. 715–748, 2006. doi: 10.1140/epjc/s10052-006-0035-3

29. A. Aktas *et al.*, "Diffractive deep-inelastic scattering with a leading proton at HERA," *Eur. Phys. J.*, vol. C48, pp. 749–766, 2006. doi: 10.1140/epjc/s10052-006-0046-0

30. A. Bruni, M. Diehl, and F.-P. Schilling, "Summary of working group B: Diffraction and vector mesons," in *12th Intl. Workshop on Deep Inelastic Scattering (DIS 2004), Slovakia (DESY-04-201)*, 2004. doi: 10.48550/arXiv.hep-ph/0410106 Preprint arXiv:hep-ph/0410106

31. F.-P. Schilling, "Diffractive final states with the H1 detector at HERA," in *Intl. Europhysics Conference on High-Energy Physics (EPS-HEP 2003), Aachen, Germany*, vol. C33, 2004. doi: 10.1140/epjcd/s2004-03-1680-9 pp. s530–s532

32. F.-P. Schilling, "Inclusive diffraction at HERA," in *31st Intl. Conference on High Energy Physics (ICHEP 2002), Amsterdam, The Netherlands*, vol. 117, 2003. doi: 10.1016/S0920-5632(03)90578-0 pp. 403–407

33. C. Adloff *et al.*, "Diffractive jet production in deep inelastic e^+p collisions at HERA," *Eur. Phys. J.*, vol. C20, pp. 29–49, 2001. doi: 10.1007/s100520100634

34. F.-P. Schilling, "Diffractive dijet production at HERA," in *7th Intl. Workshop on Deep Inelastic Scattering (DIS 1999), Zeuthen, Germany*, vol. 79, 1999. doi: 10.1016/S0920-5632(99)00700-8 pp. 287–289