

PHILIPP DENZEL



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ℹ Born: 19/08/1991
in Richterswil (CH)
Nationality: D
Residence permit: C (EU/EFTA)

I have academic experience in problem solving, data science, scientific software development, and collaborating with international and local research teams. I am a physicist and computational scientist by training who is highly adaptable and passionate about a broad spectrum of scientific fields, in particular computer science, general relativity/cosmology/astrophysics, hydrodynamics, and quantum physics. I am eager to apply my skills to new technical challenges in order to contribute to the advancement of technologies in aid of society.

🎓 Education

2016 - 2021	Doctor of natural sciences (PhD), in Theoretical Physics, University of Zürich (UZH), Switzerland Focus: Theoretical Astrophysics & Cosmology Thesis: <i>Exploring models of lensing galaxies: On bridging the gap between observations, models, and simulations</i> ↴
2015 - 2016	Master of Science, in Computational Science, University of Zürich (UZH), Switzerland Focus: Computational Science Minor: Theoretical Astrophysics Thesis: <i>Radiation hydrodynamics of star formation: Infrared feedback in molecular clouds</i> ↴
2010 - 2014	Bachelor of Science, in Physics, University of Zürich (UZH), Switzerland Focus: General physics Minor: Informatics Thesis: <i>Molecular dynamics simulations of bubble nucleation</i>
2004 - 2010	Matura graduation 2010, Kantonsschule Freudenberg (KFR), Switzerland Focus: Languages (Latin and English) Minor: Applied Mathematics and Chemistry Thesis: <i>The chemistry of Alzheimer's disease</i>

⚙️ Practical Experience

today	Machine Learning Engineer at the Centre for Artificial Intelligence (ZHAW), Switzerland ➢ work on the SKAO project as part of a member of the SKACH consortium
July 2022	Work on free and open-source software ➢ see my GitHub page for details ➢ Summer school "Introduction to Quantum Machine Learning by IBM" (online)
June 2022	
June 2021	
April 2021	PhD program in Theoretical Physics at the Institute of Computational Science UZH, Switzerland ➢ I developed the scientific software gleam , an analytics module which includes a highly optimized (cosmic) ray-tracing algorithm in Python, Cython and C wrappers. ➢ I developed the Python-based graphical user interface ModelZapper packaged as a linux and macOS app, for deployment in future citizen science projects. ➢ I developed a javascript framework lensing.js implemented in the streaming-lens and zurich-lens web apps for demonstration purposes at public outreach events. ➢ I provided a new, independent measurement for the Hubble parameter , describing the rate of expansion of the Universe. ➢ I have encountered various inverse problems from astrophysical and cosmological observations which required creative and novel approaches for solutions. ➢ I have analyzed large data sets from NASA/ESA satellites and telescopes in order to test cosmological models with strong gravitational lenses. ➢ I have generated and analyzed large data sets of hydrodynamical simulations on supercomputers to test star-formation and galaxy-formation theories. ➢ I have acquired excellent presentation, lecturing, and communication skills during my time as a teaching assistant at the University of Zurich.
Aug 2016	

☰ Skills

OPERATING SYSTEMS	🐧 Linux (arch, debian, red hat, and derivatives) 🍏 macOS 🖥 Windows
PROGRAMMING	🐍 Python, 🐾 Java, 💡 Shell scripting, C, Cuda, Fortran, Haskell, Elisp, 💄 Javascript, HTML, CSS, SQL
FRAMEWORKS	OpenMP, MPI, SLURM, numpy, scipy, pandas, Tensorflow, Keras, PySpark, PyTorch, Qiskit, Flask, Tkinter, MySQL, jQuery, OpenCV, tesseract-ocr, etc.
CERTIFICATES	IBM AI Engineering Professional Certificate ↴
TEXT PROCESSING	TEX, Org-mode, MS Office/LibreOffice
DEVELOPMENT TOOLS	git, GNU Emacs, Visual Studio Code, Eclipse
COMPUTING & DATA ANALYSIS	Ray-tracing, Markov-chain Monte-Carlo modelling, machine learning, deep learning, supercomputer-generated data reduction pipelining and automation, interactive data visualization and animation, N-body/hydrodynamical simulations, quantum algorithms, etc.

Languages

- German (native)
- English (fluent, professional proficiency)
- Latin (ancient, written form)
- basics in French, Russian

Strengths

- passionate about (computer) science
- motivated
- adaptable
- autonomous

💻 Projects

During my free time, I occasionally like to explore new ideas for self-advancement or just for fun. Here are a few notable projects from my GitHub repositories:

LICHT [🔗](https://pypi.org/project/licht)

ONGOING

A GTK-based applet for controlling Philips Hue lights on linux.

Python request pyyaml PyGObject (GTK)

DEEP-GESTURE [🔗](https://github.com/phdenzel/deep-gesture)

ONGOING

A custom LSTM neural net for gesture action recognition.

Python OpenCV Tensorflow Keras MediaPipe json tarfile HDF5

OLLAM [🔗](https://github.com/phdenzel/ollam)

2018

A fun, natural language processing program which implements a long short-term memory neural network. When trained on William Shakespeare's sonnets, it is able to generate 'artificial' poems.

Python Tensorflow Keras HDF5

📖 Research Publications

- ◆ Barrera, B., Williams, L. L. R., Coles, J. P., & **Denzel, P.** (2021). Bridging the gap between simply parametrized and free-form pixellated models of galaxy lenses: The case of wfi 2033-4723 quad. *The Open Journal of Astrophysics*, 4.
[🔗](https://doi.org/10.21105/astro.2108.04348)
- ◆ **Denzel, P.**, Palmer, X. G., et al. (2021). The lens SW05 J143454.4+522850: A fossil group at redshift 0.6? *Monthly Notices of the Royal Astronomical Society*, 506(2), 1715–1722. [🔗](https://doi.org/10.1093/mnras/stab1825)
- ◆ **Denzel, P.**, Mukherjee, S., & Saha, P. (2021). A new strategy for matching observed and simulated lensing galaxies. *Monthly Notices of the Royal Astronomical Society*, 506(2), 1815–1831. [🔗](https://doi.org/10.1093/mnras/stab1716)
- ◆ Ding, X., Treu, T., Birrer, S., Chen, G. C. . . , Coles, J., **Denzel, P.**, et al. (2021). Time delay lens modelling challenge. *Monthly Notices of the Royal Astronomical Society*, 503(1), 1096–1123. [🔗](https://doi.org/10.1093/mnras/stab484)
- ◆ **Denzel, P.**, Coles, J. P., Saha, P., & Williams, L. L. R. (2021). The Hubble constant from eight time-delay galaxy lenses. *Monthly Notices of the Royal Astronomical Society*, 501(1), 784–801. [🔗](https://doi.org/10.1093/mnras/staa3603)
- ◆ **Denzel, P.**, Mukherjee, S., Coles, J. P., & Saha, P. (2020). Lessons from a blind study of simulated lenses: Image reconstructions do not always reproduce true convergence. *Monthly Notices of the Royal Astronomical Society*, 492(3), 3885–3903. [🔗](https://doi.org/10.1093/mnras/staa108)
- ◆ **Denzel, P.**, Diemand, J., & Angélil, R. (2016). Molecular dynamics simulations of bubble nucleation in dark matter detectors. *Physical Review E*, 93(1). [🔗](https://doi.org/10.1103/physreve.93.013301)

👤 Conferences & Workshops

31 Jul, 2020	invited talk, SCIENCE CAFÉ: THE HUBBLE CONSTANT FROM 8 TIME-DELAY LENSES, at UCL
4–5 Feb, 2019	workshop, MACHINE LEARNING FOR HIGH ENERGY PHYSICS, at UZH, 🔗
27 Jan–2 Feb, 2019	talk & workshop, 49TH SAAS-FEE LECTURES, by the Swiss Society for Astrophysics & Astronomy, 🔗
23 Sep, 2018	invited public outreach talk, 100 WAYS OF THINKING, exhibition at Kunsthalle Zürich, 🔗
3–7 Sep, 2018	talk & workshop, THE UNIVERSE AS A TELESCOPE, conference at University of Milan, 🔗
3–6 April, 2018	talk, EWASS - EUROPEAN WEEK OF ASTRONOMY & SPACE SCIENCE 2018, conference in Liverpool, 🔗
5–6 Feb, 2018	talk, Swiss COSMOLOGY DAYS 2018, conference at CERN, 🔗
22–24 Aug, 2017	talk, winner of Science Slam competition, CSZ GRADUATE SCHOOL WORKSHOP, in Gwatt (BE), 🔗
18 Apr, 2017	invited public outreach talk, SCIENCE TRAIL: ON THE HUNT FOR DARK MATTER, at Urania Sternwarte, 🔗
21–25 Nov, 2016	project with Nvidia, ACADEMIA INDUSTRY MODELING WEEK, by the CSZ, 🔗

🏛️ Teaching Experience

2017–2019	Scientific Computing I & II (lecture, UZH)	TA, (inverted-classroom style) lecturer, and Python instructor
2016–2017	Computer Simulations I & II (lecture, UZH)	TA, lecturer, and Java instructor
Spring, 2016	Computational physics (lecture, UZH)	TA and Python instructor
2013–2014	Physics I & II (lab work, UZH)	TA and supervisor of Röntgen machine & ECG experiments

❝ References

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