Philipp Denzel

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- in linkedin.com/in/philipp-denzel
- 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: *Exploring models of lensing galaxies:*
On bridging the gap between observations, models, and simulations 📥

2015 - 2016 — Master of Science, in Computational Science, University of Zürich (UZH), Switzerland
Focus: Computational Science | Minor: Theoretical Astrophysics
Thesis: *Radiation hydrodynamics of star formation: Infrared feedback in molecular clouds* 📥

2010 - 2014 — Bachelor of Science, in Physics, University of Zürich (UZH), Switzerland
Focus: General physics | Minor: Informatics
Thesis: *Molecular dynamics simulations of bubble nucleation*

2004 - 2010 — Matura graduation 2010, Kantonsschule Freudenberg (KFR), Switzerland
Focus: Languages (Latin and English) | Minor: Applied Mathematics and Chemistry
Thesis: *The chemistry of Alzheimer's disease*

⚙️ Practical Experience

today
July 2022 — **Machine Learning Engineer at the Centre for Artificial Intelligence (ZHAW), Switzerland**
> work on the SKAO project as a member of the `SKACH` consortium

June 2022
June 2021 — **Work on free and open-source software**
> see my `GitHub` page for details
> Summer school "Introduction to Quantum Machine Learning by IBM" (online)

April 2021
Aug 2016 — **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.

☰ 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	LaTeX, 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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