

# PHILIPP DENZEL



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

I have experience in problem solving, data science, scientific software development, and collaborating with international and local 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 general relativity/cosmology, quantum physics, and computer science. I am eager to apply my skills to scientific and/or industrial challenges in order to contribute to the advancement of technologies in aid of society.

## 🎓 Education

- 2016 - 2020 Under review for: Doctor of natural sciences, 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 | PhD program in Theoretical Physics at the Institute of Computational Science UZH, Switzerland  
Aug 2016
- I have encountered various inverse problems from astrophysical and cosmological observations which required creative and novel approaches for solutions.
  - 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 have analyzed large data sets from NASA/ESA satellites and telescopes in order to test cosmological models with strong gravitational lenses.
  - I have generated, processed, 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.
  - I developed a javascript framework [lensing.js](#) implemented in the [streaming-lens](#) and [zurich-lens](#) web apps for demonstration purposes at public outreach events.

## 💻 Skills

- |                           |  |
|---------------------------|--|
| OPERATING SYSTEMS         | 🐧 Linux (arch, debian, red hat, and derivatives)   🍏 macOS   🖥 Windows   |
| PROGRAMMING               | 🐍 Python, 🎵 Java, 💾 Shell scripting, C, Cuda, Fortran, Elisp, 💻 Javascript, 💬 HTML, 💡 CSS  |
| FRAMEWORKS                | OpenMP, MPI, pandas, Tensorflow, Flask, Tkinter, Qt, MySQL, jQuery, OpenCV, tesseract-ocr  |
| TEXT PROCESSING           | TEX, Org-mode, MS Office/LibreOffice   |
| DEVELOPMENT TOOLS         | git, GNU Emacs, Visual Studio Code, Eclipse  |
| COMPUTING & DATA ANALYSIS | Ray-tracing algorithms, Markov-chain Monte-Carlo modelling, signal extraction/filtering, machine learning, supercomputer-generated data reduction pipelining and automation, interactive data visualization and animation, computer simulations, N-body algorithms, hydrodynamical simulations, bayesian uncertainty quantification, multivariate regression modelling, principal component analysis |

## 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 sometimes like to explore new ideas for self-advancement or just for fun. Here are a few notable projects from my GitHub repo:

**MYMTG**  <https://github.com/phdenzel/mymtg>

ONGOING

A playing-card recognition program which can detect and analyze cards from a camera stream.

Python Flask OpenCV aiohttp asynchio

**OLLM**  <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 'artifical' poems.

Python Keras Tensorflow HDF5

**PENTAPLEX**  <https://github.com/phdenzel/pentaplex>

2017

A prototype of a receipt scanner/reader which uses OCR and machine-learning, image-processing routines to digitize paper receipts.

Python tesseract-ocr OpenCV ImageMagick

## Research Publications

- ◆ Denzel, P., Palmer, X. G., Çatmabacak, O., Coles, J. P., Corner, C., Ferreras, I., Feldmann, R., Küeng, R., Leier, D., Saha, P., & Verma, A. (2020). The lens SW05 J143454.4+522850: A fossil group at redshift 0.6?, submitted to *Monthly Notices of the Royal Astronomical Society*.
- ◆ Denzel, P., Mukherjee, S., & Saha, P. (2020). A new strategy for matching observed and simulated lensing galaxies, submitted to *Monthly Notices of the Royal Astronomical Society*.
- ◆ Denzel, P., Coles, J. P., Saha, P., & Williams, L. L. R. (2020). The Hubble constant from eight time-delay galaxy lenses. *arXiv e-prints*, 2007.14398, arXiv:2007.14398.  <https://arxiv.org/abs/2007.14398>
- ◆ Ding, X., Treu, T., Birrer, S., Chen, G. C. ..F., Coles, J., Denzel, P., Galan, M. F. A., Marshall, P. J., Millon, M., More, A., Shajib, A. J., Sluse, D., Tak, H., Xu, D., Auger, M. W., Bonvin, V., Chand, H., Courbin, F., Despali, G., ... Williams, L. L. R. (2020). Time Delay Lens modelling Challenge: II. Results. *arXiv e-prints*, 2006.08619, arXiv:2006.08619.  <https://arxiv.org/abs/2006.08619>
- ◆ 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

Fall, 2019	Scientific Computing I (lecture, UZH)	TA, (inverted-classroom style) lecturer, and Python instructor
Spring, 2019	Scientific Computing II (lecture, UZH)	TA, (inverted-classroom style) lecturer, and Python instructor
Fall, 2018	Scientific Computing I (lecture, UZH)	TA, (inverted-classroom style) lecturer, and Python instructor
Spring, 2018	Informatics in Physics (lecture, UZH)	TA, (inverted-classroom style) lecturer, and Python instructor
Fall, 2017	Introduction to Astrophysics (lecture, UZH)	TA and (inverted-classroom style) lecturer
Spring, 2017	Computer Simulations I (lecture, UZH)	TA, lecturer, and Java instructor
Fall, 2016	Computer Simulations II (lecture, UZH)	TA and Java instructor
Spring, 2016	Computational physics (lecture, UZH)	TA and Python instructor
Spring, 2014	Physics II (lab work, UZH)	TA and supervisor of electrocardiography experiments
Fall, 2013	Physics I (lab work, UZH)	TA and supervisor of Röntgen machine experiments

## References

PROF DR Prasenjit Saha

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