

# Daniel Lenz

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DanielLenz  
LenzDaniel

*Physicist, data scientist, and software developer using machine learning and data analysis to solve hard problems in physics & astronomy.*

*Looking to apply my skills to new technical challenges in other domains.*

## Work

- Since 10/2016 **Computational Physicist**, *NASA Jet Propulsion Laboratory/California Institute of Technology.*
- Scientist in astrophysics/cosmology
  - Using HPC and machine learning techniques to advance data analysis of TB-scale astronomical data sets
  - Advance state-of-the-art through automatization and use of generalized linear models, cross validation, A/B testing, random forests, regularization, Bayesian inference
  - Contributions to open source projects (e.g. healpy, cygrid, astropy)
- 05/2013 – **Graduate student**, *Argelander Institute for Astronomy (AIfA), Bonn.*
- 07/2016
- PhD in astrophysics; data processing and analysis of TB-scale radio astronomy data
  - Develop data processing and deployment pipeline, going from raw telescope data to final published data products, software development in Python
- 01/2010 – **Student research assistant**, *AIfA/Max Planck Institute for Radio Astronomy, Bonn.*
- 04/2013
- Data reduction and -analysis for a large-scale radio astronomy project

## Education

- 10/2008 – **PhD Astrophysics, MSc Astrophysics, BSc Physics**, *University of Bonn.*
- 09/2016
- PhD *magna cum laude*
  - Award for academic excellence in MSc, accepted to the *Honors Branch* of the graduate school during PhD

## Skills

- Python 8+ years of daily usage  
Software-development, signal processing, machine learning, deep learning  
SciPy, Numpy, scikit-learn, pandas, Tensorflow/Keras, Matplotlib, dask, Jupyter
- Other languages Some C++ , Java, Julia
- Techniques Data analysis, signal processing, Fourier analysis, HPC computing, continuous integration, basics in AWS/Google Cloud

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## Projects

- Deep learning for image analysis
- Combining various TB-scale astronomy data sets
  - Using generative adversarial networks (GAN) to model the complex physics
  - Used to separate different image components
  - Recently started work, using tensorflow/keras and work on GPU clusters
- healpy
- <https://github.com/healpy/healpy>
  - Implementation of the most-used data format in large-area astronomy
  - I improve the Python layer, extend it towards new language features, added Docker support to ease development
  - Interacting with other core developers, strategic planning, interacting with and advising the user base
- cygrid
- <https://github.com/bwinkel/cygrid>
  - Fast, parallel, and unbiased gridding of data on the sphere in Python/Cython
  - 1-2 orders of magnitude faster than other implementations in e.g. SciPy, while providing many more options (kernels, real-world coordinates)
  - Used in large-scale production data processing by international telescope facilities
- Research in physics & astronomy
- Data science, machine learning, and HPC computing to address various research questions
  - Usage of and contributions to a wide range of Python libraries
  - Various publications in peer review journals, (invited) talks at international conferences, writing grant proposals

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## Grants

- 2019 **JPL Data Science Pilot**, *Teaching Machines the Way of the cosmic microwave background: Toward efficient de-lensing and component separation*, \$50k.

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## Awards

- 2018 **JPL Outstanding Postdoctoral Research Award**, *NASA Jet Propulsion Laboratory*.
- 2013 **Member of the Honors branch**, *Bonn-Cologne Graduate School of Physics and Astronomy*.
- 2012 **Scholarship for academic excellence**, *University of Bonn*.

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## Publications

13 total, 4 first author. Full list at <https://bit.ly/2RnlydC>