Björn S. Konrad

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linkedin.com/in/bjorn-sten-konrad/ | Nationality: Swiss, Swedish

Professional Experience

Swiss Federal Institute of Technology (ETH) *Zürich, Switzerland*
Doctoral Studies *Dec. 2020 - Present*

- Use of Bayesian inference methods to characterize the atmospheres of terrestrial exoplanets from the measured infrared spectrum.
- As a team, we develop and improve an efficient, fast, and unbiased Bayesian atmospheric retrieval routine in Python and FORTRAN.
- Use of statistical methods to investigate the biases in atmospheric retrievals and develop methods to mitigate these biases.
- Visualization and interpretation of high-dimensional, multimodal parameter distributions.
- Use of machine learning approaches to accelerate atmospheric retrievals while maintaining the interpretability of the results
- Active involvement in teaching, student supervision, and as substitute lecutrer.
- Publications with major contribution: https://doi.org/10.1051/0004-6361/202141964, https://doi.org/10.1051/0004-6361/202243760
- Research website: https://konradbjorn.github.io

Education

Swiss Federal Institute of Technology (ETH) *Zürich, Switzerland*
Doctor of Sciences ETH *Dec. 2020 - Present*

- Main research focus: Atmospheric retrievals for terrestrial exoplanets. The goal is to understand how well terrestrial exoplanets can be characterized from ther light spectra. I use a Bayesian approach to predict the performance of future space-based telescopes via numerical simulations.

Swiss Federal Institute of Technology (ETH) *Zürich, Switzerland*
Master of Science ETH in Physics, with distinction *Sept. 2018 - Aug. 2020*

- Thesis: *Atmospheric Retrieval Sensitivity Analysis for Earth-Twin Exoplanets.*
- Active engagement as teaching assistant and undergraduate mentor.
- Honoured with the ETH silver medal for outstanding Master's theses 2021.

Swiss Federal Institute of Technology (ETH) *Zürich, Switzerland*
Bachelor of Science ETH in Physics *Sept. 2014 - Aug. 2017*

- Thesis: *Simulation of Planet and Brown Dwarf Detection Probability in Binary Systems.*
- Major in Physics, minor in Mathematics

University Projects

Atmospheric Retrieval Sensitivity Analysis for Earth-Twin Exoplanets *Zürich, Switzerland*
Swiss Federal Institute of Technology (ETH) *Feb. 2020 - Aug. 2020*

- Use of Bayesian inference methods to characterize the atmosphere of a planet from the measured infrared spectrum.
- Development of an efficient, fast, unbiased atmospheric retrieval pipeline in Python and FORTRAN.
- Visualization and interpretation of high-dimensional, multimodal parameter distributions.
- Derive instrument requirements for a future space-telescope from the results of the atmospheric retrieval studies.
- Honoured with the ETH silver medal for outstanding Master's theses 2021.
- Publication: https://doi.org/10.1051/0004-6361/202141964

Cryogenic Characterization of the Grating-Vector APP for the ERIS Instrument at the VLT. *Zürich, Switzerland*
Swiss Federal Institute of Technology (ETH) *Sept. 2019 - Jan. 2020*

- Developing an analysis piepeline in Python for infrared image data taken on a cryogenic optical bench.
- Noise reduction, image cleaning, and inferrence of missing values using mathematical models.
- Characterizing the performance of an optical element using the pipeline.
- Publication: https://doi.org/10.1117/1.JATIS.7.4.045001

Simulation of Planet and Brown Dwarf Detection Probability in Binary Systems. *Zürich, Switzerland*
Swiss Federal Institute of Technology (ETH) *Jan. 2017 - Jul. 2017*

- Developing an efficient Monte-Carlo based simulation approach to predict the detection yield of a ground based exoplanet survey using IDL.
- Visualization of vast amounts of data in an easily understandable manner using Python.
- Draw conclusions on the best observation strategy based on statistical analysis of the simulation output.

Extracurricualr Experience

Swiss Civil Service Duty *Schlieren, Switzerland*
Naturnetz *Oct. 2017 - Sept. 2018*
- Construction and maintenance of Swiss nature reserves and active promotion of endangered species and the local biodiversity.
- Obtained valuable insights into the importance of an intact and functioning ecosystem.

Mandate as student representative *Zürich, Switzerland*
Advisory commission of the Central Advisory Council for Education of the Canton of Zürich *Aug. 2011 - Jul. 2015*
- Political representation of Zürich's high school students.

Programming Skills

Languages	Advanced: Python (e.g., Pandas, PyTorch, NumPy); Intermediate: FORTRAN, C++, HTML/CSS, IDL, shell scripting
Visualization	Python for 3-D/2-D data visualisation, LaTeX for process visualization.
Operating systems	Unix-/Linux-based operating systems, Windows
IDE's	Visual Studio Code, Spyder

Honours and Awards

2021	**ETH silver medal for outstanding Master's theses**, Master of Science ETH in Physics	*Switzerland*
2020	**ETH graduation with distinction**, Master of Science ETH in Physics	*Switzerland*
2014	**Outstanding maturity theses in mathematics**, Highscool Graduation	*Switzerland*

Personal Interests/Hobbies

Scientific outreach	I love sharing my passion for science and actively engage in scientific outreach.
Sports	I like to spend time outdoors dooing sports such as hiking, running, skiing. I often participate in marathons.
Reading	I am a big fan of science fiction and philosophy and am always looking for a great read.
Trading	I am interested and actively investing in the stock market in my free time.

Languages

(Swiss-)German	Bilingual proficiency
English	Bilingual proficiency
French	Professional working proficiency
Swedish	Limited working proficiency
Russian	Elementary proficiency