Joris Josiek

Personal Information

Date of Birth:	[redacted]	*Address:*	[redacted]
Place of Birth:	Dresden, Germany	*Phone:*	[redacted]
Citizenships:	German, French	*Email:*	joris.josiek@etu.unige.ch

Education

09/2021 — 06/2023	*M.Sc. in Astrophysics* 1st year grade[1]: 5.75 Specialization: Stellar Physics	*Université de Genève* Geneva, Switzerland
10/2018 — 08/2021	*B.Sc. in Physics* Final grade[2]: 1.3 Specialization: Theoretical Physics	*Technische Universität Dresden* Dresden, Germany
08/2016 — 06/2018	*High school diploma ("Abitur")* Final grade[2]: 1.1 Specialization: Mathematics and Physics	*Marie-Curie-Gymnasium* Dresden, Germany

Earlier secondary and primary education in Germany (2006-2009, 2015) and the UK (2009-2015)

Research Experience

09/2022 — 06/2023
Winds of Massive Stars
M.Sc. Thesis
- Reviewing recent literature to study proposed mass loss mechanisms in massive main sequence stars.
- Contributing to the GENeva stellar Evolution Code (GENEC) in Fortran by implementing new mass loss prescriptions based on the findings in the literature.
- Computing evolutionary models of stars of 20 to 120 solar masses using GENEC and reducing and analysing the output data in Python.
- Exploring the effect of main-sequence winds on the overall evolution of massive stars and developing observational tests for the different mass loss prescriptions.
- Selecting, extracting and analysing archival observational data to investigate the validity of the mass loss models.

03/2022 — 09/2022
Red Supergiants Mass Loss
Semester lab project and subsequent summer internship
- Investigated a new empirical mass loss prescription for red supergiants using GENEC and compared its effect on stellar evolution with previous prescriptions.
- Designed a pipeline in Python in order to reduce, analyze and visualize the model data.
- Simulated observables of individual stars and stellar populations and interpreted the results within the context of previous literature on red supergiants.

09/2021 — 01/2022

[1] Swiss Grading System: 4.00 (pass) — 6.00 *max.*
[2] German Grading System: 4.0 (pass) — 1.0 *max.*

Optical Interferometry on Solar System Planets
Semester lab project
- Reviewed literature on astronomical interferometry and simulated dummy observational data in Python.
- Conducted observational runs of Jupiter on a 60cm Newtonian telescope (TELESTO) equipped with an interferometry mask consisting of two holes of varying baselines.
- Built a pipeline in Python to calibrate the raw CCD images using flat-field, bias and dark images.
- Analyzed the collected data on Jupiter and archival data on Mars by fitting the observations with simulated models using a self-programmed MCMC algorithm.
- Extracted the angular diameter of the planets as one of the fitting parameters of the model.

04/2021 — 07/2021
Semiclassical Motion of Charge Carriers in Planar Graphene
B. Sc. Thesis
- Reviewed the mathematical formalism of the two-dimensional massless Dirac equation to describe charges in planar graphene in the presence of an electric and a magnetic field.
- Conducted analytical derivations to explore parity, time-reversal and charge conjugation symmetries of the system and explored the analogy between electron-hole pairs in Graphene and particle-antiparticle pairs in fundamental physics.
- Applied a semiclassical approximation to the system in order to obtain equations of motion and then used these to simulate the trajectories of particles under various magnetic and electric fields in Python.

08/2020 — 04/2021
Electromagnetic Resonance in Optically Anisotropic Cavities
Student internship (10hrs/week)
- Reviewed literature related to the propagation of electromagnetic waves in optically anisotropic media.
- Built a versatile modular simulation program in Python from scratch to be used by the group as a tool to simulate the optical behavior of user-defined layered anisotropic structures. This included calculating polarization-dependent transmission and reflection coefficients, finding resonance modes in optical cavities and calculating their two-dimensional dispersion relation and energy loss rate.
- Supplemented the built software with an easy-to-use user interface and wrote an accompanying user guide.

Teaching Experience

2019 — 2021: Teaching Assistant (3 cumulative semesters)
Technische Universität Dresden

04/2021 — 09/2021
Theoretical Classical Mechanics (for 1st year Physics B.Sc. students)
- In charge of optional group tutoring for approximately 25 participants in calculus and linear algebra to accompany the main lectures and exercises, focussing on the application of mathematical methods in the context of classical mechanics.
- Individually developed an interactive curriculum of 12x 90-minute tutoring sessions based on reported weaknesses and interests of participating students.
- Prepared and led the tutoring sessions weekly on Zoom.
- Assisted in creating and reviewing exercise problems and sample solutions, as well as grading exercise submissions and the final exam.

10/2020 — 02/2021
Theoretical Quantum Mechanics (for 2nd year Physics B.Sc. students)
- Held weekly 90-minute sessions on Zoom to guide and support students through the exercise problems as well as review the lecture material.
- Assisted in creating and reviewing sample solutions to the exercises, as well as grading exercise submissions.

10/2019 — 02/2020
Introduction to Programming (for 1st year Physics B.Sc. students)
- Held weekly 90-minute sessions presenting solutions to exercises, giving tutorials of key concepts in Python to help reinforce the lecture material, and supervising students during their individual programming work.
- Assisted in grading exercise submissions.

Other Work Experience

01/2019 — 06/2020 (12hrs/week), 09/2020 — 06/2021 (8hrs/week)
Infineon Technologies Dresden
Student internship

- Managed and maintained databases in MS Excel and created macros in Visual Basic for data extraction and analysis.
- Developed machine automation with Arduino in C++.
- Tested and optimized new equipment by collecting and analyzing usage data.
- Created utilities in bash to automate data reduction.

Grants

Swiss Society for Astrophysics and Astronomy (SSAA)
Young scientist travel support 2023 (1 000 CHF)

- Contributed talk in “The Wolf-Rayet phenomenon in the Universe”, Morelia, Mexico (June 2023)

Skills

Programming

- Python 3 (advanced level, including extensive use of numpy, scipy, matplotlib, pandas, astropy)
- Fortran 90 (intermediate level)
- C++, Visual Basic, bash (basic skills)

Productivity

- MS Office (and open-source equivalents)
- LaTeX

OS

- Linux (Ubuntu)
- Windows (all versions since XP)

Languages

German (native)
French (native)
English (fluent oral and written command)
Spanish (conversational - CERFL B1 level)
Italian (basic)

Hobbies

Reading
Literary journalism, speculative fiction, thrillers and mystery, investigative journalism

Practicing piano
Classical music (in the broad sense) – favorite composers are Schubert and Liszt

Hiking, Cycling, Traveling, Exploring new foods

Revised 25 May 2023