Markus Strickert

Computational Engineer

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Profile

Programming, modeling, analysis of large datasets using various numerical methods, computational physics (including general physics), **astronomy,** mathematics, **data visualization**, academic writing, experience in presenting and effective communication

Programming

- **Python -** Modeling, data-handling, SPH, piping, AMR, visualization (1D-3D), animation (1D-3D), wrappers, object-oriented programming, broadcasting
- **Fortran -** Scientific codes, CFD, SPH, in-situ data extraction
- **Bash/awk -** Data-handling/filtering
- **Git -** Workflow, Command-line and GUI experience
- **Dart/Kivy -** Basic application design
- **LaTeX -** Academic writing, scientific article publications
- **Excel (VBA)-** Data-handling, data analysis, visualization
- **C++/C -** Signal processing, HW implementations

Technical Skills

- **Physics** (specialized in astrophysics), **numerical analysis,** mathematics, data handling/visualization, HPC computing (Snellius, Kepler)
- **System Testing and Verification,** testing electronics, signal processing (HW and SW), Test/requirement specification documentation (DOORS NG).

Scientific codes

- MOCCA, Nbody6++gpu, BATS-R-US (AWSoM), MESA, CFD, SPH
- **Tecplot**, Topcat, Gnuplot, Manim, Kivy, **python visualization** (**Matplotlib**, seaborn etc), **NumPy**, SciPy, integrators (e.g Runge-Kutta), Fourier analysis

Summary

Versatile expert in **data analysis**, **physics, programming,** and mathematics. Experienced with **SPH, CFD analysis, Monte Carlo methods, 3D MHD models and FEM, among others.** Strong programming and research background, confident in dynamic system simulations and applied physics. Highly organised, adaptable, and values collaboration for professional growth. Enjoys taking on leadership roles and thrives in both group and independent settings.

Publications

2024
Leiden Observatory

High-latitude coronal mass ejections on the young solar-like star AB Dor (1st author MNRAS publication)

Performed Coronal Mass Ejection and stellar wind simulations on the young solar like star AB Doradus using the SWMF BATSRUS 3D magnetohydrodynamic simulations. We investigated the interaction between plasma expansion vs overlying magnetic tension and discuss the probability of elucidating CMEs on stars other than the sun.

2020 - 2022
Lund Observatory

Black Hole Dynamics in Stellar Clusters (Master Thesis)

I investigated the production of single and binary black holes in globular cluster models simulated using the MOCCA code. The code involves an MC Monte Carlo method for population synthesis (SSE+BSE codes) and N-body (fewbody) code for dynamics. I used extensive Python codebases with integrated bash and awk scripts for post-process data analysis.

2017-2020
Lund University

Galactic Dynamics and the spread of Galactic Civilisations (Bachelor Thesis)

Modeled epicycle motions of stars in the Milky Way galaxy and simulated planetary abiogenesis using MC Monte Carlo methods. I created a self-consistent Python script to simulate the development and propagation of galactic civilizations across the galaxy.

Merits and Awards

2023 - KISS Workshop/Think tank (Caltech, Ca)

Nominated and selected to be one of few early career candidates to attend the KISS workshop aiming to develop future space missions for extrasolar space weather.

Bängt Bodèns Fond

Award/stipend for demonstrated leadership and commitment in the Frisksport Association in Motala, Sweden.

2022 - Degree of Master of Science (127.5 Credits)

Main field of study: Astrophysics (official transcripts, courses and certificates can be given upon request).

2020 - Degree of Bachelor of Science (180 Credits)

Main field of study: Physics (official transcripts, courses and certificate can be given upon request).

Detailed Competence Profile

2022 - present
Leiden Observatory
PhD Researcher
Modeling stellar winds and CMEs with 3D MHD simulations to assess how quiescent wind conditions change due to episodic mass ejections. Post-process CFD data analysis using (Py)Tecplot with results compared with real observations (Hubble, EUVE data). Python and Linux/awk are utilized for data filtering and visualization. Resources using Snellius.

2023 - 2023
Leiden Observatory
Teaching Assistant
Team member of lab sessions in an exoplanet course, responsible for co-developing course materials centered around the utilization of the MESA code for atmospheric escape modeling.

2023 - 2023
Max Planck Institute, Göttingen
BCool – Exospace Weather Workshop/Conference
I held a talk about the suppression of CMEs in the context of strong overlying magnetic fields on AB Doradus from applied 3D MHD models using the BATS-R-US code.

2022 - 2022
Leiden Observatory
Astroflow Workshop
I presented my Master Thesis research at the workshop and worked with doctoral-, post-doctoral- and external speakers at Leiden University.

2021 - 2021
Heidelberg, Germany
Workshop – Direct N-body simulations
Online school on gravitational N-body simulations of dense clusters and introduction to using the Nbody6++GPU code and supercomputers (HPC, Kepler).

2021 - 2021
Evanston, USA
TRENDY3 – Stellar Evolution and Dynamics
Conference on exploring the various observational and theoretical aspects of triple (multiple) evolution and dynamics, and the unique role played by triple (and hierarchical) systems.

2021 - 2021
Lund Observatory
Research project
Applied Smoothed Particle Hydrodynamics to simulate 576 stellar collisions. Implemented a Delaunay triangulation method for post-process analysis and visualized data using Matplotlib. Acquired results will be contained in an upcoming paper. Resources using Aurora and SNIC.

2020 - 2021
Motala, Sweden
Assistans för dig AB
Personal caretaker in a household being responsible for medication, social activities and care attendance. Worked with PEG, Epilepsy and Neural disorders.

2019 - 2020
Lund University
Associates
Head position of the Mentor Committee in the science department of Lund, introducing new students to the University.

2017 - 2018
Lund University
Kulturnatten
Annual event for scientists in Lund to inspire and teach physics experiments to the locals and visitors of the city.

2016 - 2016
Linköping, Sweden
Alminia Assistans
Personal caretaker working with paralysis diagnosis. Learned the basics of tracheostomy, respiratory equipment and general caretaking.

2015 - 2017
Motala, Sweden
Hammarstrands Assistans
Personal caretaker for two recipients. Received internal license for medical dosing, worked with intimacy caretaking and social development.

2015 - 2015
Motala, Sweden
Östergötlands Idrottsförbund
The role of a "young leader" entailed being responsible for several groups of children and guiding them through various kinds of activities. Received basic education in anatomy, injury treatment and leadership.

2011 - 2017
Motala, Sweden
Motala Frisksportklubb
Association working towards equality, health and activity. Board member between 2013-2014. Throughout the period I was a leader in educating various sports (trampoline, circus, freerunning and gymnastics). Planned and organized a course in freerunning for all ages. Helped design and develop a freerunning park in Motala Sweden which was established in 2014.

Additional Licenses & Misc.

Standard B driver's license, alcohol serving (A & B certificate), leadership license (Frisksport)

Languages: Swedish (Native), English (Professional), German (Basic)

References

Dr. Abbas Askar (Supervisor of Master project)
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Dr. Aline Vidotto (Direct supervisor of PhD project)
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