

## Curriculum Vitae for Pia Zacharias

### Personal information

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### Summary

I am a physicist with more than ten years of experience in scientific computing and a PhD in the field of numerical astrophysics. My areas of expertise include statistical data analysis, signal processing, the development of machine learning models and their integration into machine learning platforms, as well as the implementation of visualization tools for big data and image analysis. My analytical mindset and a solid background in physics provide me with a good foundation for finding solutions to complex problems. I am an experienced project leader, thriving to continuously develop my skills, while working either alone or in a team.

### Technical skills

Frameworks	NumPy/SciPy, Keras/Tensorflow, Scikit-Learn, Statsmodels, Pandas, Matplotlib, MPI, OpenMPI
Languages	Python, Fortran, C++, IDL, GDL, GNU Octave, LaTeX
Platforms	Google Cloud Platform, Amazon Web Services
Tools	Git, Docker, Mac OS X, Linux, Windows, Pycharm, Jupyter Notebook, Microsoft Office

### Education

2006 – 2010	PhD (Dr. rer. nat.) in physics from University of Freiburg, Germany. Thesis titled "Analysis of 3D MHD simulations of the solar corona"
2005 – 2006	Diploma degree in physics (Dipl. Phys.) from University of Freiburg with specialization in astrophysics and plasma physics. Thesis titled "Investigating stellar coronae using models of stellar structure"

## Professional experience

2018 –	Consultant, Expert Analytics
2013 – 2018	Researcher (postdoc), Institute of Theoretical Astrophysics, University of Oslo. A 4-year appointment including 15% course lecturing and 10% student supervision/mentoring
2011 – 2013	Researcher (postdoc), International Space Science Institute, Bern, Switzerland with 25% administration/teaching responsibility
2006 – 2010	PhD student, Kiepenheuer Institute for Solar Physics, Freiburg, Germany. A 4-year appointment including 75% research and 25% teaching

## Languages

English	Fluent
French	Basic
German	Mother tongue
Norwegian	Working knowledge

## Personal skills

Analytical mindset	Ability to collect and analyze information to find solutions in a time-efficient manner. Skilled in physics, math, programming, statistics and machine learning
Effective communication	Condensing difficult material into a comprehensive language and grasp the bigger picture behind things
Flexibility	Adapt quickly and successfully to changing situations and environments
Leadership and responsibility	Experienced project leader with both national and international collaborators. I am open-minded and responsible, while working structured and result-oriented.
Problem-solving	Breaking down problems into small, manageable parts. Finding solutions by combining methods across disciplines

## Some interests and hobbies

Scientific outreach	Scientific talks (at conferences, public events, summer schools and high schools), Astronomy On Tap (initiator of a series of events presenting astronomy for the public)
Sports and nature	Running, mountain biking, skiing, yoga, national level certified track and field coach

## Extended descriptions of selected projects

Activity	Audio Analytics for Predictive Maintenance in Hydropower
Role	Lead Data Scientist
Staffing	Team of 6 (extended team of 10)
Description	In this R&D project, we have tested the use of audio equipment as a non-invasive alternative for state-of-the-art vibration sensors. I have been leading the analytics team, which is in charge of developing and implementing deep learning and advanced machine learning models on edge as well as in the customer's cloud computing system. Furthermore, the high frequency audio data has been combined with operational data in a Python based machine learning platform, which is continuously monitoring the health status of the equipment. I have also been involved in the strategic planning and the implementation of the project on site and responsible for the interpretation and presentation of results to management and stakeholders.
Tools	Python, Github, Gitlab, Amazon Web Services, signal processing, cloud computing, edge computing

Activity	Predictive Maintenance for Heavy Rotating Machinery in Hydropower
Role	Senior Data Scientist
Staffing	Team of 3
Description	This project aims at prolonging the lifetime of hydropower generators and reducing their risk of failure as well as downtime due to maintenance actions. We are applying advanced statistical methods and machine learning techniques to heavy assets using Python for data processing, analysis and visualization. This includes data-driven model development applying time-series anomaly detection techniques and code development of cloud based products for running analytical models in production with notification services. I have been the main contact for the communication of technical results and concepts to non-technical stakeholders and managers.
Tools	Python, GitLab, Azure, Docker

Activity	Taskforce Advanced Analytics and Machine Learning for Windpower
Role	Senior Data Scientist
Staffing	Team of 3
Description	The project goal was the development of a curtailment strategy for wind turbines based on data-driven prediction models. Based on sensor data from wind turbines, we identified prediction markers, which point to failure and established a life-time prediction model for wind turbine converters. In addition, a model was established for the optimal proactive exchange of wind turbine converters given restrictions in the supply chain. All models are integrated in a scalable machine learning platform solution, which can be applied across fleet and easily adapted to other wind farms.
Tools	Python, Github, Docker, Jira

Activity	Work schedule optimization
Role	Lead Data Scientist
Staffing	Team of 3
Description	Optimization of work schedules, opening hours and staffing for a chain of stores based on data-driven prediction models and time-series forecasting methods.
Tools	Git, Python, SQL, Google Optimization Tools, Facebook prophet model
Activity	Anomaly detection in a plant production process at Aker BioMarine
Role	Senior Data Scientist
Staffing	Team of 2
Description	The goal of this project was to obtain a better understanding of the sensor data to enable the business side to take steps to avoid slow-downs in the production process. We created an asset hierarchy and data model for the production process by interpreting the available Human Machine Interface (HMI) screens from the factory. Data access is obtained through wrapper functions for queries to a GoogleCloud database. I ran time-series analyses of sensor data to monitor data quality, product flow, correlations, anomalies, etc. to get insights on the various processes in the production line, such as filling rates, predictive maintenance and downtimes. All computations were performed using Python. The code is shared using GIT, enabling cooperation and versioning. Documentation in the form of Jupyter notebooks.
Tools	Git, GoogleCloud Database Platform, MySQL, Python, Excel, Jupyter Notebook
Activity	Analysis of magnetohydrodynamic models of the solar atmosphere
Role	Project leader
Staffing	Core team of 5, extended team of 10 collaborators
Description	This project on three-dimensional MHD models of the solar atmosphere aims at a detailed understanding of the underlying mechanisms, which lead to the high temperatures of the outer atmosphere of the Sun and other stars. I was leading the analysis part of the project, which includes carrying out numerical simulations on high-performance computing facilities, implementing new physics modules in the Fortran code, as well as the analysis of synthetic spectra and their comparison with ground- and space-based solar observations. The results of this project have been published in peer-reviewed journals and were presented at international conferences.
Tools	HPC, MPI, Python, Fortran, Git, CVS, IDL