OTHMAN M. BENOMAR

Master Plasma Physics (Hons), PhD Physics
(Orsay University – France)

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Profile Data Scientist | Data Modeler | Astrophysicist (Asteroseismology)

Visa status Japanese working Visa (1st July 2019 – 23 August 2025), Thai marriage Visa (unlimited)

Summary

- Bringing over 15 years of dedicated experience in conducting research to address complex scientific data challenges.
- Led international scientific collaborations in several renowned research institutes. Prepared and refereed a 100+ research papers in top-tier scientific journals, grants, and proposals. Participated to design decisions and implementations of PLATO, the next generation of space telescope for exoplanets science and asteroseismology. Managed and delivered lecture courses at bachelor and master level. Supervised tens of research projects for undergrad and PhD students. Presented research, project designs at conferences and research institutes around the world for 15+ years.
- Built out delivery pipelines for timeseries analysis and near-real time data science products, with monitoring system for errors. Design, comprehensive stress tests of pipelines/ infrastructure/algorithms guaranteeing that set specifications are met in the context of Space missions CoRoT (CNES), Kepler (NASA) and PLATO (ESA).
- Use of multiple compute and data architectures (AWS, Supercomputers, Clusters, PC) and OS (Mac, Linux, Windows, DSM).
- Involved in the design, development, and delivery of tens of data science and data analysis algorithms for space science. Making use of complex statistical analysis, mathematical optimization, asteroseismic inversion techniques, various machine learning and deep learning algorithms.

Publications

- **Peer-reviewed** : 13 first author + 9 second author + 5 third author + 51 others, including in Science and Nature.
- **Not peer-reviewed** : 16 proceedings, including 4 first author (conference talks).
- **Indicators:** h-index = 41, citations = 4400+.
- **Complete list of publications** available in the ADS server (http://adsabs.harvard.edu).

Skills & abilities

Management: Led international research collaborations. Initiated many successful academic and collaborations. Extensive grant and proposal writing. Conference and workshop organizer. Reviewer for various international research organizations and journals. Student supervisor. Lecturer and course coordinator. Contributor in public outreach events.

Coding: **Python, C++, IDL**, Fortran, SQL, GO, R, Haskell, HTML, LabView, Mathematica, MetaTrader, **C-shell, Bash-shell, slurm** (scripting), Git queries / workflows.

Machine Learning: Use of TensorFlow, PyTorch within Keras for Autoencoders, Deep Neuronal Networks, CNN, LSTM, Decision forests and other scikit-learn components.

Mathematics: Hypothesis testing, decision making and statistical analysis, optimization, MLE, MAP, MCMC, Bayesian analysis, differential equations, tensor and matrix operations, forecasting, physics modelling, numerical simulation, decomposition analysis (PCA, Fourier and Wavelet transform…), filtering.

Optimisation: Multi-threading (OMP, MPI), multi-processing (CPU, GPU), asyncio, benchmarks, unit, and property-based testing.

Visualisations: IDL, matplotlib (Python), gnuplot, Excel, PowerPoint.

Databases: MySQL, MariaDB, Non-SQL database (custom-made).

Experience

SELF-EMPLOYED | OUTSOURCING CONTRACTOR FOR CRAFTSMAN SOFTWARE

Lead data scientist | September 2024 – Now

- Developing a statistical and machine learning pipeline for real-time analytics on business operations of distributed systems. **Assisting DevOps and MLOps** in detecting software anomalies in Kubernetes environments: system intrusions and inefficiency patterns.

NATIONAL ASTRONOMICAL OBSERVATORY OF JAPAN, JAPAN

Project Associate Professor at NAOJ | July 2019 – August 2024

- **Performed space science research**. Develop statistical and Machine Learning algorithms and pipelines providing insight for complex unstructured Terabyte-size data for PLATO.
- **Supervised PhD students** (Siddharth Dhanpal, Yuting Lu, Yoshiki Hatta) in Data science applied to scientific research.
- Published in journals, educate, and participate to international conferences. Performed outreach missions in schools and institutions regarding the goals of science.
- **Scientific Projects:**
  - Machine Learning for identification and evolved star's classification.
  - Fast, reliable Deep Learning parameter estimation in evolved stars.
  - Statistical analysis of the shape of stars and its root physical causes: stellar activity.

NEW YORK UNIVERSITY IN ABU DHABI, UAE

Research associate | November 2015 – June 2019

- Participated to **the establishment of the Data Centre for Space Science** at NYUAD.
- Detection and characterisation of exoplanets using statistical optimization methods on Terabyte-size data. **CCD image processing and Data mining**. CNN for stellar pulsation mode identification.
- **Supervision of a PhD student** (Shoya Kamiaka): Statistical ensemble study of rotation in stars observed by the Kepler space mission.
- Supervision of an undergraduate (Rakesh Nath) in Autoencoders for signal filtering.
- **PLATO:** Participation to the study report (ESA Red and Yellow Books).

JAPAN SOCIETY FOR PROMOTION OF SCIENCE, JAPAN

Research Fellow in the University of Tokyo | October 2013 – October 2015

- Study of stellar rotation using asteroseismology and surface rotation indicators. **Turbulence study in stellar cores**.
- Successfully secured a research grant of 11 M¥ (10% success rate). Successful 3 days observation grant at Okayama Observatory.
- Teaching a full Master level class on stellar physics.
- Outreach by visiting multiple high schools to promote science and technology in Japan.

PHYSICS DEPARTMENT AT THE SYDNEY UNIVERSITY, AUSTRALIA

Postdoctoral Fellow | October 2010 – October 2013

- Successful in securing an Australian Research Council grant for 3 years.
- Teaching practical astronomy undergrad classes.
- Detection and parameters estimation of evolved stars using Bayesian model selection methods. Understanding newly discovered complex asteroseismic patterns in space-based timeseries.

Education

2010, PHD IN STATISTICAL METHODS APPLIED TO STELLAR PLASMA PHYSICS

Orsay Paris Sud XI University, France

Designing and creating the first ever analysis pipeline for timeseries analysis using Fourier transform and a Langevin Metropolis-Hasting Monte Carlo sampler. Utilizing Bayesian methods for space data in CoRoT and Kepler. Modelling stellar structure and evolution.

2007, MASTER IN PLASMA AND OPTIC PHYSICS

Orsay Paris Sud XI University | Ecole Polytechnique, France

Studying design and processes for building the next generation of nuclear (fusion) reactors. Studying diagnostic techniques in industrial and astrophysics plasmas.

References Contact details for references are available upon request.