Fran Bartolić

PhD candidate in astrophysics working on probabilistic modeling of time-series data. Interested in applying my skills to solving problems in an industry setting.

website: fbartolic.github.io
email: fb90 *at* ast-andrews.ac.uk
github: fbartolic
location: Oxford, UK

Personal information

Nationality Croatian

Languages Croatian (Native), English (Fluent)

Experience

09/2017–today **Ph.D. project**, *School of Physics & Astronomy, University of St Andrews*, Scotland.

I build probabilistic models of astrophysical time series data using advanced Bayesian statistical methods for the purpose of inferring properties of exoplanets. In the process, I write open-source code written in Python. I am particularly interested in building interpretable models in a regime where prior information and expert knowledge cannot be neglected. The methods I use in my research include Hamiltonian Monte Carlo, Gaussian Processes, linear models, Variational Inference and automatic differentiation.

02/2020–06/2020 **Research analyst**, *Center for Computational Astrophysics (CCA), Flatiron Institute (Simons Foundation)*, New York, USA.

I spent 5 months working in a team with two other scientists on a probabilistic model for inferring two-dimensional surface maps of exoplanets given only one-dimensional time series measurements. This project incorporates cutting edge methods on the intersection of statistics, machine learning and computational astrophysics.

Skills

Programming Python, C/C++.

Tools and libraries PyMC3, Pyro, JAX, theano, Stan, scikit-learn, PyTorch, Jupyter, Pandas, matplotlib.

Statistics & ML Probabilistic modeling, general linear models, MCMC, Variational Inference, Bayesian decision making, Gaussian Processes, frequentist statistics, Neural Networks.

Other technical Git, Vim, Linux, basic Azure DevOps, HTML & CSS.

Communication I have given talks at conferences and meetings in academia as well as talks to the general public. I have given tutorials for an undergraduate course in in astronomy. I have experience with describing complex statistical methods to a lay audience.

Mentoring I have tutored undergraduates in astronomy.

Education

2017–2022 (expected) **Ph.D. Astrophysics**, *University of St Andrews*, St Andrews, Scotland.
This position is a part of a scheme funded by the UK government whose goal is to produce PhD graduates with data science skills relevant to industry positions.

2015–2017 **M.Sc. Physics with Astrophysics**, *University of Rijeka*, Rijeka, Croatia.
Cumulative GPA: 4.7/5. Courses in theoretical physics. Exchange project at Lund University in Sweden where I worked on an independent research project for 7 months.

2012–2015 **B.Sc. Physics**, *University of Split*, Split, Croatia.
Cumulative GPA: 4.5/5. Courses in theoretical physics and programming. Exchange semester in Lund, Sweden.

Publications

2021 **F. Bartolić** & M. Dominik (in prep). Statistical challenges in modeling gravitational microlensing events.

2021 **F. Bartolić**, R. Luger, D. Foreman-Mackey (in prep). Occultation mapping of Io's surface in the near-infrared II: Inferring dynamic maps

2021 **F. Bartolić**, R. Luger, D. Foreman-Mackey (in prep). Occultation mapping of Io's surface in the near-infrared I: Inferring static maps

2021 R. Luger, E. Agol, **F. Bartolić**, D. Foreman-Mackey (in prep). Analytic Light Curves in Reflected Light: Phase Curves, Occultations, and Non-Lambertian Scattering for Spherical Planets and Moons.

2020 N. Golovich, W. Dawson, **F. Bartolić**, et al. A Reanalysis of Public OGLE-III and IV Gravitational Microlensing Events, arXiv:2009.07927

2018 V. Bozza, E. Bachelet, **F. Bartolić**, T. M. Heintz, A. R. Hoag, and M. Hundertmark. *VBBINARYLENSING: a public package for microlensing light-curve computation.*, 2018, MNRAS, 479, 5157. doi:10.1093/mnras/sty1791

Awards, Competitions and Honors

2019 *Arthur Maitland Prize* for the best talk, University of St Andrews.

2015 *Dean's Award for undergraduate academic excellence*, University of Split.