

# Fran Bartolić

## Curriculum Vitae

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### Personal information

Nationality Croatian  
Languages Croatian (Native), English (Fluent)

### Education

- 2017–2021 (expected) **Ph.D. Astrophysics**, *University of St Andrews*, St Andrews, Scotland.  
This PhD position is a part of a new scheme funded by the UK government with a strong focus on producing PhD graduates with Data Science and industry relevant skills. In my research, I am primarily interested in building interpretable probabilistic models using advanced methods such as Bayesian modeling and Machine Learning.
- 2015–2017 **M.Sc. Physics with Astrophysics**, *University of Rijeka*, Rijeka, Croatia.  
Cumulative GPA: 4.7/5. I spent the first three semesters doing courses in theoretical physics and astronomy. In the final semester I worked on a research project at Lund University in Sweden for 7 months.
- 2012–2015 **B.Sc. Physics**, *University of Split*, Split, Croatia.  
Cumulative GPA: 4.5/5. I took courses in theoretical physics and programming. In the final semester I did a short research project as an exchange student in Lund, Sweden.

### Research Experience

- 09/2017–today **Ph.D. project**, *School of Physics & Astronomy, University of St Andrews*, Scotland.  
I am working on modeling astrophysical time series data using advanced Bayesian methods. I am interested in building probabilistic models of astrophysical time series data in order to extract useful information about populations of extrasolar planets. These models are complex, non-linear, and have degenerate parameter spaces, a regime where even the most sophisticated statistical methods regularly fail. The statistical methods I use in my research include Gaussian Processes, Hamiltonian Monte Carlo, linear models, and neural networks. I am approaching the PhD project bottom-up, starting with simple interpretable models, solving one challenging problem at the time, and writing usable and scalable open-source code in the process.
- 02/2017–09/2017 **Master's thesis project**, *Lund University*, Sweden, 30 weeks FTE work.  
The subject of the thesis was to construct analytical and numerical models describing the dynamics of extrasolar planets. I developed both an analytical pen and paper model, and used numerical simulations to understand the relevant physical phenomenon. The project involved writing Python code for solving symbolic equations and making plots, and interfacing Python code with a solver for differential equations written in C++.

07/2016– **Summer research program**, *Nicolaus Copernicus Astronomical Center*, Warsaw,  
08/2016 Poland, 4 weeks FTE work.

I worked on astrophysical fluid dynamics simulations using a popular astrophysics code written in C++. I spent my time running simulations and writing a data visualization code in Python. I learned to work with Linux based computer clusters.

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## Skills

- Programming** I have extensive experience in Python, together with libraries NumPy, Pandas, matplotlib, and Jupyter notebooks. Besides Python. I have intermediate experience with C/C++, and have written code combining Python and C++. I have used C# in the past.
- Data science** Extensive experience with the probabilistic programming library PyMC3 together with theano. I have implemented simple machine learning models in Tensorflow and PyTorch.
- Statistics** Extensive experience with Bayesian modeling and MCMC methods. Some experience with classification problems.
- Other technical** Git version control, Vim, L<sup>A</sup>T<sub>E</sub>X, Linux systems, Bash shell.
- 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 astronomy. I have experience with describing complex statistical methods to a lay audience.
- Organization** I am organizing a regular meeting on Data Science at my department and co-organising a weekly meeting on coding.
- Mentoring** I have supervised a summer student working on a machine learning project in astronomy.

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## Publications

- 2019 **F. Bartolić** et. al. (in prep). Paper on building a hierarchical Bayesian model for astrophysical time series prediction.
- 2019 **F. Bartolić** et. al. (in prep). Paper on Bayesian modeling of microlensing events using Gaussian Processes and Hamiltonian Monte Carlo.
- 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.*, 479:5157–5167, October 2018. doi: 10.1093/mn-ras/sty1791

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## Awards, Competitions and Honors

- 2016 *Erasmus+ Internship* scholarship.
- 2015 *Dean's Award for undergraduate academic excellence*, University of Split.
- 2014 *Erasmus+ Exchange* scholarship.