# Fran Bartolić

*Curriculum Vitae*

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## Personal information

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| 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 statistical methods such as Bayesian models 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. The main challenges I am working on is how to build probabilistic models of complex astrophysical phenomena in order to extract useful physical 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 thesis 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++`.

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

## 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. |
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| Data science | I use the probabilistic programming library `PyMC3` extensively 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`, LaTeX, `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 experience in giving tutorial to undergraduate students in astronomy. I have experience with describing complex statistical methods to a lay audience. |
| Organizational | I am organizing a regular meeting on Data Science at my department and co-organising a meeting on coding. |
| Mentoring | I have supervised a summer student working on a machine learning project in astronomy. |

## Publications

| 2019 | **F. Bartolić** et. al. (in prep). Building a hierarchical Bayesian model for astrophysical time series prediction. |
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| 2019 | **F. Bartolić** et. al. (in prep). 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 |

## Awards, Competitions and Honors

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