

Andrija Kostić | Curriculum Vitae

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Education

Max Planck Institute for Astrophysics

PhD, International Max Planck Research School, Bayesian forward modelling of LSS

Garching, Germany

2020 – present

Ludwig Maximilians University

Master in Theoretical Physics

GPA: 1.19/1.0

Munich, Germany

2018 – 2020

University of Belgrade, Faculty of Mathematics, Department of Astronomy

Bachelor in Astronomy and Astrophysics

GPA: 9.78/10.00

Belgrade, Serbia

2014 – 2018

Gymnasium "Svetozar Marković"

Grammar school class for students gifted in physics

Niš, Serbia

2010 – 2014

Music high school "Vojislav Vučković"

Guitar, Piano, Music Theory, Choir, Composing

Niš, Serbia

2010 – 2012

Publications and Conference Proceedings

Consistency tests of the field level inference with the EFT likelihood:

Kostić A., Nguyen M., Schmidt F., Reinecke M.; arXiv preprint arXiv:2212.07875 – submitted to JCAP

Constraints on dark matter annihilation and decay from the large-scale structure of the nearby universe:

Bartlett D., Kostić A., Desmond H., Jasche J., Lavaux G.; Accepted for publication in Physical Review D

Optimal machine-driven acquisition of future cosmological data:

Kostić A., Jasche J., Ramanah K.D., Lavaux G.; A&A 657, L17 (2022)

Towards Moment-Constrained Causal Modeling:

Guardiani M., Frank P., Kostić A., Enßlin T.; Proceedings of the 41st MaxEnt2022 conference

Non-parametric Bayesian Causal Modeling of the SARS-CoV-2 Viral Load Distribution vs. Patient's Age:

Guardiani M., Frank P., Kostić A., Edenhofer G., Roth J., Uhlmann B., Enßlin T.; Accepted for publication in PLOS

Programming the LED cube with the Raspberry-Pi microcomputer:

Kostić A.; Aleksić D.; Proceedings of the IEEEESTEC 7th Student project conference; Niš, Serbia; 2014; 131-136

Dynamical evolution of dust particles ejected from the surface of comets C/2012 S1 (ISON) and C/2011 W3(Lovejoy):

Kostić. A.; Mentored by Smolić. I. and Bošković. M.; Proceedings of the 13th Petnica's annual conference for high school students; Petničke sveske; Petnica Science Center, Serbia; 2014;

Work and Research Experience

Max Planck Institute for astrophysics

PhD thesis research

Garching, Germany

October 2020 - October 2023

- Research subject: **Bayesian forward modelling of galaxy clustering and large-scale structure** mentored by Fabian Schmidt
 - Developing differentiable forward models using [lagrangian perturbation theory](#) for modelling the large-scale structure of the universe
 - Extensive use of [FFTs](#), [Hamiltonian monte carlo](#), [slice-sampling](#) techniques and [OpenMP](#) optimization
 - Side project in developing a code for simulating [dark-matter annihilation](#) from the large-scale structure called [clumpy](#)
 - Coding done mostly in [C/C++](#) and [Python](#) and [R](#) for MCMC analysis
 - The papers are available on my [arXiv page here](#)

Max Planck Institute for astrophysics

Master thesis research

Garching, Germany

September 2019 - October 2020

- Research subject: **Application of information field theory concepts to causal inference, quasi periodic signal reconstruction and variational inference algorithms** mentored by Torsten Enßlin and Reimar Leike
 - Developing differentiable forward models within [NIFTy package](#)
 - Extensive use of [gaussian processes](#), [variational inference](#), [conjugate gradient methods](#) for sampling and minimization
 - The [master thesis is available here](#)

Leiden Observatory

Research Internship

Leiden, Netherlands

5th June - 11th August, 2017

- Research subject: **Galaxy image modeling using Shapelets and sparse techniques** mentored by Arun Kannawadi and Henk Hoekstra
 - Writing down a code for [image feature extraction](#) using [shapelets](#) in Python
 - Making simulated dataset of galaxy images, by trying various approaches with a purpose of bias estimation for shapelet analysis technique
 - Results: Here is a [link to a report](#) I made and a [link to the github repo](#)

Max Planck Institute For Astronomy

Research Internship

Heidelberg, Germany

22nd June - 31st August, 2016

- Research subject: **Hunting for Intermediate Mass Black Holes in Milky Way Globular Clusters** mentored by Glenn van de Ven, Paolo Bianchini, Alessandra Mastrobuono
 - Modelling globular cluster internal dynamics and exploring the parameter space with the use of [emcee code](#)
 - Incorporating energy equipartition with a goal to improve the existing models
 - Results: Here is a [link to a modest report](#) I made

Max Planck Institute For Solar System Research

Research Internship

Göttingen, Germany

1st - 31st August, 2015

- Research subject: **Kuiper belt structure** mentored by Pedro Lacerda
 - [N-body simulations](#) of the Kuiper belt region with and without Nice model event
 - [MERCURY](#) and [REBOUND](#) integration packages used, along with [Fortran](#), [C/C++](#) and [Python](#) codes written for data analysis and visualization
 - Results: Here is a [link to a small report](#)

Petnica Science Center

Senior Teaching Assistant

Valjevo, Serbia

2014-Present

Technion Institute of Technology

SciTech Summer Science Camp

Haifa, Israel

21st July – 14th August, 2014

Petnica Science Center

Junior Researcher and presenter at the annual conferences "A Step Into Science"

Valjevo, Serbia

2010 - 2014

- 2011 - 2014 – Project name: *Dynamical evolution of dust particles ejected from the surface of comets C/2012 S1 (ISON) and C/2011 W3(Lovejoy)*
- Results: [link to a summary of research](#) I wrote (abstract and figure captions are in English)
 - Modeling the comet's nucleus and the thermodynamical processes which lead to ejection of the dust particles
 - Writing an [N-body integration](#) code and ejection physics in [C/C++](#) with addition of [Matlab](#) for image processing
 - Implementation available on [github](#): [here](#)
- 2011 - Part of the Serbian team within the MONECOM project (part of BELLISSIMA initiative with teams from Croatia and Greece) under leadership of Milan Bogosavljević
 - CCD imaging, reduction and data analysis for 13 Comets

Tičan Observatory

Višnjan Astronomy School

Višnjan, Croatia

7th - 17th August, 2013

- Project name: **Tičan Telescope Automation** mentored by MS Denis Štogl
 - Programming sensors and electronic board control with [Arduino](#) for remote control operation

Computer skills

Proficient in: C/C++ and Python

Scientific Software: R, Wolfram Mathematica

HPC libraries:

- Basic knowledge of OpenMP, MPI, JAX

Awards

2018: "Best student research paper" award, awarded by the University of Belgrade

2018: "Zaharije Brkić" prize, awarded to the best astrophysics student of the generation 2017/2018

2014: 1st place at IEEEESTEC 7th Student projects conference for the best graded paper(practical and theoretical realisation), by the reviewers marks, held in Niš, Serbia

Grants and Scholarships

DAAD scholarship (2019 - 2020): Merit based scholarship awarded to foreign students studying in Germany

Dositeja fund (2018-2023): Merit based award of Serbian Ministry of education granted to students studying outside Serbia

Mr. Russel N. Stern fund (2014): Merit based SciTech scholarship awarded to 4 applicants

Languages

- **Serbian:** Native speaker
- **German:** Intermediate
- **English:** Fluent

Interests

- Guitar, Violin and Piano
- Composing music
- Poetry
- Tennis