Andrija Kostić | Curriculum Vitae

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Education

Max Planck Institute for Astrophysics — **Garching, Germany**
PhD, International Max Planck Research School, Bayesian forward modelling of LSS — *2020 – present*

Ludwig Maximilians University — **Munich, Germany**
Master in Theoretical Physics — *2018 – 2020*
GPA: 1.19/1.0

University of Belgrade, Faculty of Mathematics, Department of Astronomy — **Belgrade, Serbia**
Bachelor in Astronomy and Astrophysics — *2014 – 2018*
GPA: 9.78/10.00

Gymnasium *"Svetozar Marković"* — **Niš, Serbia**
Grammar school class for students gifted in physics — *2010 – 2014*

Music high school *"Vojislav Vučković"* — **Niš, Serbia**
Guitar, Piano, Music Theory, Choir, Composing — *2010 - 2012*

Publications and Conference Proceedings

No evidence for p- or d-wave dark matter annihilation from local large-scale structure :
Kostić A., Bartlett J. D., Desmond, H.; arXiv preprint arXiv:2304.10301 – submitted to Physical Review D

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 J. 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 IEEESTEC 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 — **Garching, Germany**
PhD thesis research — *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 — **Garching, Germany**
Master thesis research — *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 **Leiden, Netherlands**
Research Internship *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 **Heidelberg, Germany**
Research Internship *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 **Göttingen, Germany**
Research Internship *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 **Valjevo, Serbia**
Senior Teaching Assistant *2014-Present*

Technion Institute of Technology **Haifa, Israel**
SciTech Summer Science Camp *21st July – 14th August, 2014*

Petnica Science Center **Valjevo, Serbia**
Junior Researcher and presenter at the annual conferences "A Step Into Science" *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, Croatia**
Višnjan Astronomy School *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 IEEESTEC 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
- **English**: Fluent
- **German**: Intermediate

Interests

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