

# Miha Cernetic

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Date of birth: 13.12.1994

## Education

- Jan 2020 - Dec 2023 **PhD, Physics**, *Ludwig-Maximilians-Universität München*, München, Germany, defence date: 23rd Feb 2024
- Oct 2017 - Nov 2019 **Masters of Science, Physics**, *Georg-August-Universität*, Göttingen, Germany
- 2013 - 2017 **Bachelor of Science, Physics**, *University of Ljubljana*, Ljubljana, Slovenia

## Research Experience

- Sep 2024 - now **The University of Chicago**, *Chicago, Illinois, USA*, Postdoctoral researcher
- Jan 2024 - Aug 2024 **Max Planck Institute for Astrophysics**, *Garching bei München, Germany*, Postdoctoral researcher
- Oct 2017 - Dec 2019 **Max Planck Institute for Solar System Research**, *Göttingen, Germany*, Research Assistant
- Jun 2017 - Aug 2017 **Max Planck Institute for Astrophysics**, *Garching, Germany*  
Invited research visit by Dr. Thorsten Naab
  - Analysis of zoom-in galaxy formation simulations
- Oct 2016 - May 2017 **Max Planck Institute for Solar System Research**, *Göttingen, Germany*  
Invited research visit by Dr. Alexander Shapiro
  - Numerical radiative transfer and opacity distribution function implementation in Fortran
- Aug 2016 **Max Planck Institute for Solar System Research**, *Göttingen, Germany*  
Internship supervised by Dr. Alexander Shapiro
  - Numerical radiative transfer and opacity distribution function implementation in Fortran
- Oct 2015 - Jul 2016 **Jozef Stefan Institute**, *Ljubljana, Slovenia*  
Student Researcher, supervised by Dr. Matej Lipoglavsek
  - Investigating theoretical models of nuclear reactions

## Astrophysical software projects

- TENETgpu **Main developer**, Discontinuous Galerkin GPU code developed during my PhD, accessible here.
- pygad **Maintainer since Jan 2020**, of a lightweight but comprehensive python module for analysis of Gadget and Arepo simulations, accessible here.
- trace\_pygad **Main developer**, of a pygad wrapper to trace clouds based on user-defined properties across snapshots to generate a merger tree, accessible here.

## Students

- Joanne Tan Graduate student co-supervised with Dr. Thorsten Naab, since September 2022.
- Miro Joensuu Intern co-supervised with Prof. Volker Springel, Summer 2023.

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## Software skills

Languages	CUDA C++ (MPI, openMP, Kokkos), C, PYTHON, FORTRAN, julia, Mathematica, Rust
Tools	docker, slurm, Dask, zarr, L <sup>A</sup> T <sub>E</sub> X, bash, *nix, gnuplot, IRAF

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## Publications

- 2024 **Cernetic, M.**, Springel, V., Guillet, T., Pakmor, R., *Supersonic turbulence simulations with GPU-based high-order Discontinuous Galerkin hydrodynamics*, 2023, MNRAS, 534, 1963
- 2022 **Cernetic, M.**, Springel, V., Guillet, T., Pakmor, R., *High-order Discontinuous Galerkin hydrodynamics with sub-cell shock capturing on GPUs*, 2023, MNRAS, 522, 982
- 2019 **Cernetic, M.**, Shapiro, A.I., Krivova, N.A., Solanki, S.K., Witzke, V., Tagirov, R.V., *Opacity distribution functions for stellar spectra synthesis*, 2019, A&A, 627, A157
- 2023 Fotopoulou, C. M., Naab, T., Lahén, N., **Cernetic, M.**, Rathjen, T.E., Steinwandel, U., Hislop, J. M., Walch, S., Johansson, P., *The masses, structure and lifetimes of cold clouds in a high-resolution simulation of a low metallicity starburst*, 2024, MNRAS, 534, 215
- 2021 Witzke, V., Shapiro, A.I., **Cernetic, M.**, Tagirov, R.V., Kostogryz, N.M., Anusha, L.S., Unruh, Y.C., Solanki, S.K., Kurucz, R.L. , *MPS-ATLAS: A fast all-in-one code for synthesising stellar spectra*, 2021, A&A, 653,A65
- 2021 Anusha, L.S., Shapiro, A.I., Witzke, V., **Cernetic, M.**, Solanki, S.K., Gizon, L., *Radiative Transfer with Opacity Distribution Functions: Application to Narrowband Filters*, 2021, ApJS, 255, 3
- 2020 Röttgers, B., Naab, T., **Cernetic, M.**, Davé, R., Huang, S., Kauffmann, G., Borthakur, S., *Lyman- $\alpha$  absorption at the disk-halo interface of simulated spiral galaxies*, 2020, MNRAS, 496, 152

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## Extra-research activities

- 2020 - 2023 Student representative
- 2021 - 2024 Sustainability group member at MPA

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## Awards and grants

- 2024 International HPC Summer School grant, 3000€.
- 2013 Gold medal in the Slovenian national astronomy competition.
- 2013 Best project: “Automation of an astronomical observatory” awarded by the Slovenian Centre of Excellence for Space Sciences and Technologies Space-SI.
- 2013 Municipal award in Ajdovščina for extraordinary achievements of high school students.

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## Languages

Slovenian	Mother tongue
English	Advanced
German	CEFR level: B1

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## Presentations

Oral presentations

- 2023 **34th IUPAP Conference on Computational Physics**, *Kobe, Japan*
- 2023 **Astrophysics Colloquium**, *Faculty of Mathematics and Physics, University of Ljubljana, Slovenia*
- 2022 **Astrophysics Department Seminar**, *Exeter, UK*
- 2022 **Breakthroughs in Galaxy Formation**, *Ringberg, Germany*, “Discontinuous Galerkin Hydrodynamics on GPUs and its application to Driven Turbulence”
- 2022 **Max Planck Institute for Astrophysics Institute Seminar**, *Garching, Germany*, “Discontinuous Galerkin Hydrodynamics on GPUs and its application to Driven Turbulence”
- 2018 **XXXth General Assembly of the International Astronomical Union, Focus Meeting 9, Solar Irradiance: Physics-Based Advances**, *Vienna, Austria*, “Fast Spectral Synthesis for a New Generation of Solar and Stellar Brightness Variability Models”
- 2018 **15th HITRAN Conference**, *Boston, USA*, “Importance of Line Databases for Spectral Synthesis for a New Generation of Solar and Stellar Brightness Variability Models”
- 2018 **2018 Sun-Climate Symposium**, *Lake Arrowhead, USA*, “Fast Spectral Synthesis for a New Generation of Solar and Stellar Brightness Variability Models”

### Posters

- Jun 2022 **European Astronomical Society Annual Meeting**, *Valencia, Spain*, “High-order hydrodynamics with sub-cell shock capturing on GPUs”.