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

Bricker Ostler Graduate student co-supervised with Prof. Dr. Damiano Caprioli, since September 2024.

Joanne Tan Graduate student co-supervised with Dr. Thorsten Naab, since September 2022.

Miro Joensuu Intern co-supervised with Prof. Volker Springel, Summer 2023.

Software skills

Languages CUDA C++ (MPI, openMP, Kokkos), C, PYTHON, FORTRAN, julia, Mathematica, Rust

Tools docker, slurm, Dask, zarr, LaTeX, bash, *nix, gnuplot, IRAF

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-α absorption at the disk-halo interface of simulated spiral galaxies*, 2020, MNRAS, 496, 152

Extra-research activities

2020 - 2023 Student representative

2021 - 2024 Sustainability group member at MPA

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.

Languages

Slovenian Mother tongue

English Advanced

German CEFR level: B1

Presentations

Oral presentations

2025 **Department Seminar**, *Faculty of Mathematics and Physics, Charles University, Prague, Checz Republic*

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".