THIBAULT LECHIEN

lechien@mpa-garching.mpg.de thibaultle.github.io

INTRO

Curious and enthusiastic computational astrophysics researcher with a demonstrated history of research experience in multiple projects at ESA and NASA, leading to impactful publications in astrophysics and computer science.

RESEARCH EXPERIENCE

Max Planck Institute for Astrophysics *Sep 2024 - Aug 2028*
PhD Researcher

- Advancing stellar and binary evolution using machine learning.

NASA Goddard Space Flight Center *Sep 2023 - Sep 2024*
Research Assistant

- Simulated neutron stars, ray-tracing photons and generating synthetic X-ray and γ-ray light curves based on NICER and Fermi data, enabling the simultaneous inference of neutron star mass, radius and magnetic field.
- Developed a machine learning framework that has increased the speed of neutron star parameter inference by 7 orders of magnitude. Member of the Fermi LAT collaboration.

imec *Oct 2022 - Jun 2023*
Research Intern and Master's thesis

- Investigated and implemented unsupervised computer vision methods on electron microscope images for semiconductor defect detection, saving human experts thousands of hours of labeling time.

European Space Agency - ESA *Jul 2022 - Sep 2022*
Intern in the Advanced Concepts Team

- Implemented a novel approach to reconstruct Dark Matter distributions from stellar orbits in the Galactic Centre, eliminating the need to make assumptions on the physical composition of the Dark Matter distribution.

KU Leuven *Jun 2021 - Sep 2021*
Research Intern

- Constructed a neural network to reconstruct spectral functions of confined particles in High Energy Physics, generalizing upon previous approaches and achieving state of the art performance on genuine lattice data.

KU Leuven *Jun 2020 - Sep 2020*
Research Intern

- Combined AI and evolutionary algorithms to study a problem in graph theory, gaining crucial insights into existing solvers and leading to the development of new and improved methods.

EDUCATION

Max Planck Institute for Astrophysics *Sep 2024 - Aug 2028*
PhD, Astrophysics

- Advancing stellar and binary evolution through machine learning
- Advisor: Prof. Selma de Mink

KU Leuven *Sep 2018 - Jun 2023*
M.Sc. and B.Sc., Computer Science, Magna cum Laude

- Graduated 5th out of 148 students
- Minor in Physics and Mathematics

PUBLICATIONS

4. **Thibault Lechien**, Gernot Heissel, Jai Grover, Dario Izzo (2024). Dark matter reconstruction from stellar orbits in the Galactic centre, Astronomy & Astrophysics, https://doi.org/10.1051/0004-6361/202347738
3. **Thibault Lechien**, Enrique Dehaerne, Bappaditya Dey, Victor Blanco, Sandip Halder, Stefan De Gendt, Wannes Meert (2023). Automated Semiconductor Defect Inspection in Scanning Electron Microscope Images: a Systematic Review, [arXiv:2308.08376]
2. **Thibault Lechien**, Jorik Jooken, Patrick De Causmaecker (2023). Evolving test instances of the Hamiltonian completion problem, Computers & Operations Research, https://doi.org/10.1016/j.cor.2022.106019
1. **Thibault Lechien**, David Dudal (2022). Neural network approach to reconstructing spectral functions and complex poles of confined particles, SciPost Physics, https://doi.org/10.21468/SciPostPhys.13.4.097

TALKS

Invited

- NASA Goddard Space Flight Center's AI Showcase Symposium (July 2024) "Accelerating neutron star simulations"
- Science Coffee @ ESA's Advanced Concepts Team (February 2024). "Neutron star parameter inference"
- ESA's Advanced Concepts Team's 20 Years Anniversary Workshop (September 2022). "The Dark (Matter) Side of Black Holes"

Contributed

- AstroAI Workshop, Center for Astrophysics, Harvard / Smithsonian (June 2024). "Accelerating neutron star light curve simulation and parameter inference through neural networks"
- AAS HEAD Meeting (April 2024). "Integrated Modeling of X-ray Light Curves for Self-consistent Inference of Neutron Star Mass, Radius, and Multipolar Fields"
- DSO@IJCAI (August 2021). "A general forecasting-based portfolio optimization model"

OUTREACH

- Helped to introduce members of the public of all ages to ESA's missions during Open Days, and to NASA's missions during their Interaction Days.
- Staffed the NASA Fermi booth at the 243rd meeting of AAS.
- Volunteered for NASA's Ask an Astrophysicist program, answering public queries about astrophysics.

SKILLS

Languages:	English, Dutch, French, notions of German
Programming:	Python, C++, Fortran 90, Java, MATLAB, R, Haskell
Software & Tools:	PyTorch, Parallel HPC (MPI, PBS), git, LateX
Extracurricular activities:	University Volleyball Team, Skiing, Running