THIBAULT LECHIEN

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

INTRO

Curious and enthusiastic researcher with a demonstrated history of interdisciplinary 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 Student

- Constraining key uncertainties of massive and binary star evolution using statistical modeling and inference techniques. Showing that 1) stars can accrete much more mass than commonly assumed, and 2) finding that the cores of massive stars are much smaller, leading to very different predictions for stellar populations and galaxies.

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

- Simulated neutron star emission, ray-traced photons and generated 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 developed 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 (5 FIRST-AUTHOR, 3 IN PREPARATION)

6. **Thibault Lechien**, Selma E. de Mink, Ruggero Valli, Amanda C. Rubio, Lieke A. C. van Son, Robert Klement, Harim Jin, Onno Pols (2025). Binary stars take what they get: Evidence for Efficient Mass Transfer from Stripped Stars with Rapidly Rotating Companions, Astrophysical Journal Letters, https://doi.org/10.3847/2041-8213/adfdd4
5. Greg Olmschenk, Emily Broadbent, Constantinos Kalapotharakos, Wendy Wallace, **Thibault Lechien**, Zorawar Wadiasingh, Demosthenes Kazanas, Alice Harding (2025). Pioneering High-Speed Pulsar Parameter Estimation Using Convolutional Neural Networks, Astrophysical Journal, https://doi.org/10.3847/1538-4357/ae03c0
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, https://doi.org/10.48550/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

- IAU Working Group seminar on Active B stars (December 2025)
- HEAD Frontier Seminar (May 2025) "Multiwavelength neutron star parameter inference"
- AI Showcase Symposium, NASA Goddard Space Flight Center (July 2024) "Accelerating neutron star simulations"
- ESA's Advanced Concepts Team's 20 Years Anniversary Workshop (September 2022). "The Dark (Matter) Side of Black Holes"

Contributed

- KITP Conference: Lifecycle of Stellar-mass black holes (November 2025). "Evidence for efficient mass transfer in interacting binary systems: Implications for compact object formation"
- UCSD Astronomy Department STRAND meeting (November 2025). "The Hidden Efficiency of Stellar Interactions"
- 18th Bonn Neutron Star Workshop (May 2025). "Self-consistent multi-wavelength modeling of neutron stars"
- AAS 245 Winter Meeting (January 2025). "Multi-Wavelength Light Curve Neutron Star Parameter Inference Using Neural Networks"
- 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"

Posters

- Binary Stars in the Space era, Keele University (July 2025). "Evidence for efficient mass transfer from Be+sdOB binaries"

AWARDED OBSERVING TIME

- **Co-I** for 5 hours of VLTI/GRAVITY time. “Determining precise dynamical masses of a unique Be + sdO system to calibrate the physics of binary mass transfer.”, PI: Dr. Robert Klement.
- **Co-I** for 9 nights of CHARA Array time. “Be stars with stripped companions as cornerstones of evolution of massive binaries.”, PI: Dr. Robert Klement.

SERVICE

- Mentor for underrepresented students as part of MPA’s mentorship program, aimed at increasing diversity and inclusion in theoretical and computational astrophysics.
- Developer and maintainer of the MPA Stellar Model Grid Repository, containing thousands of pre-computed stellar evolution models that are made available to the community.
- Co-organized the 19th IMPRS Symposium, consisting of a 2 day workshop with talks from PhD students and postdocs.
- Co-organizer of the Stellar Astrophysics Seminar, consisting of a weekly talk series.

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 and 245th meetings of the 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:	Volleyball, Running, Swimming