

## Research Interest

My research focuses on the **dynamics and mergers of massive black holes** across different mass scales — from **supermassive black holes** in elliptical galaxies to **intermediate-mass black holes** in dwarf galaxies, whose mergers present unique challenges such as the influence of density cores and the possibility of **off-centre mergers**. My approach combines high-resolution **N-body simulations** with theoretical studies of few-body dynamics.

## Employment

**Post-doctoral researcher** - [University of Surrey, UK](#)

2024–present

- Working with Dr Alessia Gualandris.

**PhD in Astrophysics** - [Observatoire Astronomique de Strasbourg, France](#)

2021–2024

- Worked with Pr Christian Boily & Dr Jonathan Freundlich.

## Education

**PhD degree in Astrophysics** - [Observatoire Astronomique de Strasbourg, France](#)

2021–2024

- Supervised by Pr Christian Boily & Dr Jonathan Freundlich: Massive Black Holes in Dwarf Galaxies: Off-center binary formation through gravitational capture.

**Master's degree in Subatomic Physics & Cosmology** - [Université Grenoble-Alpes, France](#)

2019–2021

- Obtained with high honours.
- Internship with Dr Martin Stref: Phenomenology of primordial black holes at the centre of galaxies.
- Master thesis with Dr Jonathan Freundlich & Dr Benoit Famaey: Dark matter core formation from stellar and AGN feedback.

**Bachelor's degree in Fundamental Physics** - [Université de Montpellier, France](#)

2016–2019

- Obtained with highest honours.
- Internship with Dr Yohann Scribano: Quantum trajectories in curved space.

## Talks & Seminars

### **Presentations** -

- MODEST 25 conference - 06/2025 - Talk.
- University of Surrey - 02/2025 - Seminar.
- GalPhases 24 conference - 08/2024 - Talk.
- MODEST 24 conference - 08/2024 - Talk.
- Observatoire Astronomique de Strasbourg - 10/2023 - Seminar.
- Royal Observatory Edinburgh - 09/2023 - Seminar.
- Conference of the French astronomical society (SF2A) - Strasbourg, France - 07/2023 - Poster.

## Teaching & Community services

### Teaching - 168h in total

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- Practical thermodynamics and optics for biology undergraduate students (72h) - 2022, 2023.
- Maths for physicists (lectures & tutorials, 12h) - 2022.
- Practical Fields & interactions for biology undergraduate students (60h) - 2021, 2022.
- Practical mechanics for physics undergraduate students (24h) - 2021.

### Student supervision -

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- Supervision of two physics undergraduate students for an internship on dark matter rotation curves - Observatoire de Strasbourg - 2023.

### Community services -

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- LOC of the National Cosmology and Galaxy Day - 2022 - Strasbourg, France.
- Weekly PhD meetings organizer at the Strasbourg observatory.

## Grants

### Grants -

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- Travel grant, International Astronomical Union - 2025
- Travel funding, Research in Mathematics, Interactions & Applications (IRMIA++), young researcher grant - 2023
- PhD studentship at the University of Strasbourg (3 years research funding) - 2021-2024

## Skills

### Computer skills -

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- $N$ -body codes : Griffin, GyrFalcon, Bonsai, REBOUND, NEMO toolbox, Agama.
- Python, C++, bash, Mathematica, LaTeX.
- Matplotlib, Scipy, Numpy, Pandas, Jupyter, Sympy.
- Pytorch, Tensorflow/Keras.
- Parallel computing and utilisation of a High Performance Computing center, SLURM.

### Languages -

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- French (native speaker), English (fluent), Spanish (basic).

### Schools -

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- Lectures Group Theory - The 34th International Colloquium on Group Theoretical Methods in Physics - 2022
- Summer School in Particle and Astroparticle Physics - 2019 - LAPTh, Annecy, France
- Physics Summer Camp - 2018 - CPPM/LAM, Marseille, France

### Additional trainings -

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- FIDLE training on deep learning, 30h (DNN, CNN, Embedding, RNN, Transformers, Autoencoder, VAE, GAN, Reinforcement learning)
- Parallel computing training, 21h (OpenMP, MPI, GPU)
- Advanced cosmology course, 50h, University of Jerusalem

## Publications

### First author publications -

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· ***Merging off-center compact stellar systems and their massive black holes***

François T. L., Bianchini P., Freundlich J., Boily C. M.  
In prep.

· ***Forming off-center massive black hole binaries in dwarf galaxies through Jacobi capture***

François T. L., Boily C. M., Freundlich J., Rozier S., Voggel K.  
2024, *Astronomy & Astrophysics*, (687, A203).

### Co-author publications -

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· ***Dynamical traction and black hole orbital migration: I. Angular momentum transfer and a fragmentation-driven instability***

Boily C.M., François T.L., Freundlich J., Combes F., Melchior A.-L., Hénin Y.  
2025, *Astronomy & Astrophysics*, (701, A10).

· ***Class Symbolic Regression: Gotta Fit 'Em All***

Tenachi W., Ibata R., François T. L., Diakogiannis F. I.  
2024, *The Astrophysical Journal Letters*, (969, L26).

· ***The response of dark matter haloes to gas ejection: CuspCore II***

Li Z., Dekel A., Mandelker N., Freundlich J., François T. L.  
2022, *Monthly Notices of the Royal Astronomical Society*, Volume 518, Issue 4, pp.5356-5375

## Reference letter writers

**Pr Boily, C. & Dr Freundlich, J.** - [Observatoire Astronomique de Strasbourg, France](#)

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· [christian.boily@astro.unistra.fr](mailto:christian.boily@astro.unistra.fr) / [jonathan.freundlich@astro.unistra.fr](mailto:jonathan.freundlich@astro.unistra.fr)

**Dr Famaey, B.** - [Observatoire Astronomique de Strasbourg, France](#)

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· [benoit.famaey@astro.unistra.fr](mailto:benoit.famaey@astro.unistra.fr)

**Dr Eranni, R.** - [Carnegie Mellon University, USA](#)

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· [errani@cmu.edu](mailto:errani@cmu.edu)