Dr Thibaut François

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Website : here

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

· 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 -

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

Community services -

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

Grants

Grants -

· 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 -

· 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 -

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

Schools -

· 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 -

· 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 -

· ***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 -

· ***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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