

FABIAN GITTINS

CONTACT INFORMATION	Department address Princetonplein 1 Utrecht University 3584 CC Utrecht Netherlands	Email address: f.w.r.gittins@uu.nl Website: fgittins.github.io
EDUCATION	PhD Mathematics University of Southampton, UK • <i>Thesis:</i> Gravitational waves from deformed neutron stars: mountains and tides • <i>Supervisor:</i> Prof Nils Andersson	Sep. 2021
	MSci Physics University of Birmingham, UK • <i>Grade:</i> First class honours • Undergraduate Master’s degree with focus on theoretical physics.	Jul. 2017
RESEARCH EXPERIENCE	Marie Skłodowska-Curie Postdoctoral Fellow GRASP, Utrecht University, NL • Carrying out Horizon Europe research programme DynTideEOS, “Constraining dense nuclear matter with the dynamical tides of neutron stars”. This research has resulted in two journal articles [18,19] and four undergoing peer-review [20–24].¹ • <i>Supervisor:</i> Prof Chris van den Broeck	Oct. 2024 – Present
	Research Fellow STAG Research Centre, University of Southampton, UK • Research focused on dynamical tides of neutron stars. Directly led to nine published journal articles [9–17]. • <i>Supervisor:</i> Prof Nils Andersson	Oct. 2021 – Sep. 2024
	PhD Researcher STAG Research Centre, University of Southampton, UK • Research focused on neutron stars as gravitational-wave sources, which directly led to five publications [2–6]. Thesis awarded Institute of Physics Gravitational Physics Group Thesis Prize for its excellence. • <i>Supervisor:</i> Prof Nils Andersson	Sep. 2017 – Sep. 2021
	Undergraduate Researcher Astrophysics & Space Research Group, University of Birmingham, UK • Research project developing data-analysis tools within rapid population-synthesis platform COMPAS, which led to two papers [7,8]. • <i>Supervisor:</i> Prof Ilya Mandel	Sep. 2016 – Mar. 2017

¹Numbered references in square brackets refer to PUBLICATIONS listed below.

	Undergraduate Researcher Jan. – May. 2016 Solar & Stellar Physics Group, University of Birmingham, UK - Group research project on science impact of NASA-MIT mission TESS. Led sub-group on asteroseismology science, which resulted in proceedings article [1]. <i>Supervisor</i>: Prof Andrea Miglio
	Intern Jun. – Sep. 2015 Astrophysics & Space Research Group, University of Birmingham, UK - Summer project on binaries that evolve into compact binaries of interest for gravitational-wave astronomy. Focused on modelling Roche-lobe overflow. <i>Supervisor</i>: Prof Ilya Mandel
GRANTS	Marie Skłodowska-Curie Postdoctoral Fellowship Oct. 2024 – Present Utrecht University, NL European Union funding for research programme <i>DynTideEOS</i>, “Constraining dense nuclear matter with the dynamical tides of neutron stars”; €203,464 (PI).
AWARDS	Gravitational Physics Group Thesis Prize 2021 Institute of Physics, UK - Awarded for excellence in physics research and communication in PhD thesis. - Invited to submit <i>Class. Quantum Grav.</i> article [15] and to deliver talk at 22nd BritGrav Conference. Awarded £500 cash prize. STAG best publication in gravitational physics 2021 STAG Research Centre, University of Southampton, UK - Awarded at STAG Public Lecture with Prof Roger Penrose for best postgraduate publication in gravitational physics [6].
TALKS	<i>Invited</i> Astrophysics Seminar 30th May 2024 Mullard Space Science Laboratory, University College London, UK <i>Title</i>: “Constraining the dense nuclear-matter equation of state with the dynamical tides of neutron stars” Gravitational-wave group 14th Dec. 2023 University of Portsmouth, UK <i>Title</i>: “Constraining dense nuclear matter with gravitational waves” Science Possibilities Investigating Neutron Stars in the UK Seminar Online 7th Jun. 2023 <i>Title</i>: “Constraining the neutron-star equation of state from dynamical tides” Symposium on Gravitational Wave Physics and Astronomy: Genesis Kyoto University, JP; Online 28th Apr. 2022 <i>Title</i>: “Making (neutron-star) mountains out of molehills”

5. **22nd BritGrav Conference** 5th Apr. 2022
University of Glasgow, UK; Online
 - *Title*: “Gravitational waves from deformed neutron stars”
 - Invited for winning **Institute of Physics Gravitational Physics Group Thesis Prize**.
6. **Colloquium** 6th Oct. 2020
Albert Einstein Institute, Hannover, DE; Online
 - *Title*: “Modelling neutron star mountains”
7. **LIGO-Virgo Collaboration Continuous-Waves Working Group** 5th Dec. 2018
Online
 - *Title*: “Population synthesis of accreting neutron stars emitting gravitational waves”

Contributed

22 talks at 20 separate conferences and meetings.

PUBLICATIONS List of publications in [NASA ADS library](#). Citation count according to NASA ADS (accessed 25th Jun. 2025).

Undergoing peer-review

- [24] Yin, S., Andersson, N. & **Gittins, F.**; A post-Newtonian approach to neutron star oscillations; [arXiv:2504.06918 \[gr-qc\]](#).
(submitted to *Class. Quantum Grav.*)
- [23] Pnigouras, P., Andersson, N., **Gittins, F.** & Counsell, A. R.; Dynamical neutron-star tides: The signature of a mode resonance.
(submitted to *Mon. Not. R. Astron. Soc.*)
- [22] Counsell, A. R., **Gittins, F.**, Andersson, N. & Tews, I.; Interface modes in inspiralling neutron stars: A gravitational-wave probe of first-order phase transitions; [arXiv:2504.06181 \[gr-qc\]](#).
3 citations (submitted to *Phys. Rev. Lett.*)
- [21] Abac, A. *et al.*; The Science of the Einstein Telescope; [arXiv:2503.12263 \[gr-qc\]](#).
58 citations (The Einstein Telescope Blue Book; submitted to *J. Cosmol. Astropart. Phys.*)
- [20] **Gittins, F.**, Andersson, N. & Yin, S.; Perturbation theory for post-Newtonian neutron stars; [arXiv:2503.03345 \[gr-qc\]](#).
(accepted by *Class. Quantum Grav.*)

Peer-reviewed

- [19] **Gittins, F.** & Andersson, N.; Neutron-star seismology with realistic, finite-temperature nuclear matter; *Phys. Rev. D* **111** (8), 083024 (2025); [arXiv:2406.06177 \[gr-qc\]](#).
6 citations

- [18] **Gittins, F.**, Matur, R., Andersson, N. & Hawke, I.; Problematic systematics in neutron-star merger simulations; *Phys. Rev. D* **111** (2), 023049 (2025); [arXiv:2409.13468 \[gr-qc\]](#).
2 citations
- [17] Counsell, A. R., **Gittins, F.**, Andersson, N. & Pnigouras, P.; Neutron star g-modes in the relativistic Cowling approximation; *Mon. Not. R. Astron. Soc.* **536** (2), 1967 (2025); [arXiv:2409.20178 \[gr-qc\]](#).
4 citations
- [16] Counsell, A. R., **Gittins, F.** & Andersson, N.; The impact of nuclear reactions on the neutron-star g-mode spectrum; *Mon. Not. R. Astron. Soc.* **531** (1), 1729 (2024); [arXiv:2310.13586 \[astro-ph.HE\]](#).
6 citations
- [14] Pnigouras, P., **Gittins, F.**, Nanda, A., Andersson, N. & Jones, D. I.; The dynamical tides of spinning Newtonian stars; *Mon. Not. R. Astron. Soc.* **527** (3), 8409 (2024); [arXiv:2205.07577 \[gr-qc\]](#).
15 citations
- [13] Beri, A., Sharma, R., Roy, P., Gaur, V., Altamirano, D., Andersson, N., **Gittins, F.** & Celora, T.; AstroSat and NuSTAR observations of XTE J1739–285 during the 2019–2020 outburst; *Mon. Not. R. Astron. Soc.* **521** (4), 5904 (2023); [arXiv:2303.13085 \[astro-ph.HE\]](#).
9 citations
- [12] **Gittins, F.**, Celora, T., Beri, A. & Andersson, N.; Modelling Neutron-Star Ocean Dynamics; *Universe* **9** (5), 226 (2023); [arXiv:2304.05413 \[astro-ph.HE\]](#).
2 citations
- [11] **Gittins, F.** & Andersson, N.; The r -modes of slowly rotating, stratified neutron stars; *Mon. Not. R. Astron. Soc.* **521** (2), 3043 (2023); [arXiv:2212.04892 \[gr-qc\]](#).
11 citations
- [10] Andersson, N. & **Gittins, F.**; Formulating the r -mode Problem for Slowly Rotating Neutron Stars; *Astrophys. J.* **945** (2), 139 (2023); [arXiv:2212.04837 \[gr-qc\]](#).
9 citations
- [9] Andersson, N., **Gittins, F.**, Yin, S. & Panosso Macedo, R.; Building post-Newtonian neutron stars; *Class. Quantum Grav.* **40** (2), 025016 (2023); [arXiv:2209.05871 \[gr-qc\]](#).
6 citations
- [8] Riley, J., Agrawal, P., Barrett, J., Boyett, K., Broekgaarden, F., Chattopadhyay, D., Gaebel, S., **Gittins, F.**, Hirai, R., Howitt, G., Justham, S., Khandelwal, L., Kummer, F., Lau, M., Mandel, I., de Mink, S., Neijssel, C., Riley, T., van Son, L., Stevenson, S., Vigna-Gómez, A., Vinciguerra, S., Wagg, T. & Willcox, R.; Rapid Stellar and Binary Population Synthesis with COMPAS; *Astrophys. J. Suppl. Ser.* **258** (2), 34 (2022); [arXiv:2109.10352 \[astro-ph.IM\]](#).
141 citations
- [6] **Gittins, F.** & Andersson, N.; Modelling neutron star mountains in relativity; *Mon. Not. R. Astron. Soc.* **507** (1), 116 (2021); [arXiv:2105.06493 \[astro-ph.HE\]](#).
40 citations

- [5] **Gittins, F.**, Andersson, N. & Jones, D. I.; Modelling neutron star mountains; *Mon. Not. R. Astron. Soc.* **500** (4), 5570 (2021); [arXiv:2009.12794 \[astro-ph.HE\]](#).
55 citations
- [4] **Gittins, F.**, Andersson, N. & Pereira, J. P.; Tidal deformations of neutron stars with elastic crusts; *Phys. Rev. D* **101** (10), 103025 (2020); [arXiv:2003.05449 \[astro-ph.HE\]](#).
35 citations
- [3] Pereira, J. P., Bejger, M., Andersson, N. & **Gittins, F.**; Tidal Deformations of Hybrid Stars with Sharp Phase Transitions and Elastic Crusts; *Astrophys. J.* **895** (1), 28 (2020); [arXiv:2003.10781 \[gr-qc\]](#).
31 citations
- [2] **Gittins, F.** & Andersson, N.; Population synthesis of accreting neutron stars emitting gravitational waves; *Mon. Not. R. Astron. Soc.* **488** (1), 99 (2019); [arXiv:1811.00550 \[astro-ph.HE\]](#).
24 citations

Review

- [15] **Gittins, F.**; Gravitational waves from neutron-star mountains; *Class. Quantum Grav.* **41** (4), 043001 (2024); [arXiv:2401.01670 \[gr-qc\]](#).
5 citations

Conference proceedings

- [1] Thomas, A., Stevenson, E., **Gittins, F.**, Miglio, A., Davies, G., Girardi, L., Campante, T. L. & Schofield, M.; Galactic Archaeology with TESS: Prospects for Testing the Star Formation History in the Solar Neighbourhood; *EPJ Web Conf.* **160**, 05006 (2017); [arXiv:1610.08862 \[astro-ph.SR\]](#).
1 citation

Software

- [7] Riley, J., Agrawal, P., Barrett, J., Boyett, K., Broekgaarden, F., Chattopadhyay, D., Gaebel, S., **Gittins, F.**, Hirai, R., Howitt, G., Justham, S., Khandelwal, L., Kummer, F., Lau, M., Mandel, I., de Mink, S., Neijssel, C., Riley, T., van Son, L., Stevenson, S., Vigna-Gómez, A., Vinciguerra, S., Wagg, T. & Willcox, R.; COMPAS: A rapid binary population synthesis suite; *J. Open Source Softw.* **7** (69), 3838 (2022).
16 citations

TEACHING
EXPERIENCE

Instructor

University of Southampton, UK

Feb. – May 2024

- *Course:* MATH1007/1009 Mathematical Methods for Physical Scientists
- *Students:* 30 (BSc level); *teaching hours:* 8
- *Responsibilities:* Coordinated problem classes; answered student questions; demonstrated problem solutions.

Guest lecturer

University of Southampton, UK

Oct. 2022, Oct. 2023

- *Course:* MATH3072 Advanced Fluid Dynamics
- *Students:* 20 (BSc level); *teaching hours:* 10
- *Responsibilities:* Delivered lectures on vector calculus for fluid dynamics.

Guest lecturer

Apr. 2022

University of Southampton, UK

- *Course:* MATH3006 Relativity, Black Holes & Cosmology
- *Students:* 30 (BSc level); *teaching hours:* 1
- *Responsibilities:* Delivered lecture on Tolman-Oppenheimer-Volkoff equations.

Teaching Assistant

Oct. 2017 – May 2021

University of Southampton, UK

- *Courses:* MATH1054/1055 Mathematics for Engineering & the Environment, MATH1057 Dynamics & Relativity, MATH1058 Operational Research I & Mathematical Computing, MATH2045 Vector Calculus & Complex Variable Theory, MATH3018 Numerical Methods, MATH3087 Maths & Your Future
- *Students:* 125 per year (BSc level); *teaching hours:* 350
- *Responsibilities:* Ran weekly problem classes, computing labs and workshops; marked coursework, tests and presentations.

Teaching Assistant

Jan. – Apr. 2016

King Edward's School, Birmingham, UK

- *Course:* Secondary-school physics
- *Students:* 75 (11–16 yr); *teaching hours:* 96
- *Responsibilities:* Supported physics teacher during lessons, helped with demonstrations and answered questions. Delivered class and devised questionnaire to assess learning styles.

SUPERVISION

Mentor

Jan. 2023 – Sep. 2024

University of Southampton, UK

- *PhD student:* Rahime Matur
- Carried out research project on thermal effects in merger simulations [18].

Mentor

Sep. 2021 – Sep. 2024

University of Southampton, UK

- *PhD student:* Rhys Counsell
- Researching impact of nuclear reactions on neutron-star g -modes [16,17] and the detectability of interface modes [22].

Mentor

Sep. 2021 – Sep. 2024

University of Southampton, UK

- *PhD student:* Shanshan Yin

- Exploring neutron-star seismology in post-Newtonian theory [9,20,24].

Mentor

Sep. 2021 – Sep. 2023

University of Southampton, UK

- *PhD student*: Thomas Celora
- Studied validity of traditional approximation for rotating neutron stars [12] in context of thermonuclear X-ray burst observations [13].

OUTREACH

Southampton Science and Engineering Festival

7th May 2022, 18th Mar. 2023

University of Southampton, UK

- Organised science exhibit on neutron stars two years running, which included arts and crafts, videos, posters and games. Coordinated teams of about 10 volunteers and engaged with members of public, particularly young families.

Mathematical Challenge

Mar. – Apr. 2020

UK Maths Trust, UK

- Marked over 200 pupil entries for Maths Challenge.

Maths & Physics Workshop

8th Nov. 2017

University of Southampton, UK

- Demonstrator in workshop for secondary-school pupils, which took place before [STAG Public Lecture](#) with Prof Jocelyn Bell Burnell. Helped pupils with fun and challenging maths and physics problems.

MEDIA

ENGAGEMENT

Selected articles:

- **New Scientist**: “[Lightest neutron star ever found could contain compressed quarks](#)” (24th Oct. 2022)
- **Live Science**: “[Neutron star ‘mountains’ may be blocking our view of mysterious gravitational waves](#)” (21st Jul. 2021)
- **The Register**: “[Mountains on neutron stars are not even a millimetre tall due to extreme gravity](#)” (21st Jul. 2021)
- **The Independent**: “[Scientists find tiny mountains on neutron stars that are a fraction of a millimetre tall](#)” (19th Jul. 2021)
- **Royal Astronomical Society press release**: “[A bug’s life: millimetre-tall mountains on neutron stars](#)” (19th Jul. 2021)
- **Gizmodo**: “[Neutron Stars Have Mountains That Are Less Than a Millimeter Tall](#)” (18th Jul. 2021)
- **New Scientist**: “[Neutron stars are remarkably smooth thanks to their intense gravity](#)” (24th May 2021)

MEMBERSHIP	<i>Large collaborations</i>	
	Einstein Telescope Collaboration: Member	Sep. 2023 – Present
	Cosmic Explorer Consortium: Member	May 2024 – Present
	Virgo Collaboration: Member	Oct. 2024 – Present
	<i>Scientific societies</i>	
	International Astronomical Union: Junior member	May 2023 – Present
	European Astronomical Society: Member	Nov. 2021 – Present
	The International Society on General Relativity and Gravitation: Lifetime member	May 2021 – Present
	Institute of Physics: Member	Apr. 2021 – Present
	Committee member of Gravitational Physics Group	Oct. 2021 – Present
	Royal Astronomical Society: Elected fellow	Jul. 2021 – Present
REVIEWING	<i>Journals</i>	
	Physical Review Letters	Apr. 2025 – Present
	Physical Review D	Jun. 2024 – Present
	The Astrophysical Journal	Oct. 2023 – Present
	Nature Astronomy	May 2023 – Present
	Astronomy & Astrophysics	May 2023 – Present
	Journal of Physics G: Nuclear and Particle Physics	Feb. 2023 – Present
	Monthly Notices of the Royal Astronomical Society	Jul. 2021 – Present
	<i>Proposals</i>	
	EPSRC open fellowship	May 2024
CONFERENCE	SPINS-UK 2024 meeting	10th–12th Sep. 2024
ORGANISATION	University of Southampton, UK	
	Part of local organising committee. Led website development and contributed to overall organisation.	
	Continuous gravitational waves and neutron stars workshop	17th–20th Jun. 2024
	Albert Einstein Institute, Hannover, DE	
	Part of scientific organising committee that set agenda of meeting, invited speakers and selected contributed talks. Event involved over 50 participants.	
	Gravitational Physics Annual Meeting	18th Jan. 2024
	Institute of Physics, UK	
	As part of Gravitational Physics Group committee, co-organised meeting by setting theme and inviting speakers. Event involved over 50 participants.	
	23rd BritGrav Conference	13th–14th Apr. 2023
	University of Southampton, UK	
	Co-organised conference on gravitational physics (scientific and local organising committee). Event involved over 100 attendees from a range of disciplines within	

gravitational physics with about 40 talks.

DEPARTMENTAL	Gravity Seminar	Oct. 2021 – Sep. 2024
ACTIVITIES	University of Southampton, UK • Co-organised weekly seminars on gravitational physics. Involved inviting and liaising with speakers.	
	Reading group	Jan. – Jul. 2021
	University of Southampton, UK • Organised weekly reading group on topic of neutron-star seismology, including PhD students and faculty.	
COMPUTER	Scientific	
SKILLS	• Wolfram Mathematica • LaTeX	
	Programming	
	• C++ (intermediate) • Julia (advanced) • MATLAB (intermediate) • Python (advanced)	
	Version control	
	• Git (see GitHub profile)	
ADDITIONAL	Introduction to cluster computing	13th Sep. 2019
TRAINING	University of Southampton, UK • Training day on high-performance computing facilities, with demonstrations on supercomputer Iridis. Involved training on accessing and using high-performance computing.	
	Orientation to teaching & demonstrating	13th Oct. 2017
	University of Southampton, UK • Training day on teaching and demonstrating. Involved discussions on how to design good lesson plans and tutorials that are engaging to undergraduate students.	
	Public engagement training	3rd Oct. 2017
	School of Physics & Astronomy, University of Southampton, UK • Training session on how to engage public with science. Involved presentations on how to organise appealing and engaging science activities, as well as practical information on health and safety considerations.	