

CONTACT DETAILS

Institute of Space Sciences (ICE-CSIC, IEEC)
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RESEARCH INTERESTS

Neutron Stars: macroscopic quantum states, rotational and magnetic field evolution, spin glitches, laboratory analogues, population synthesis for isolated pulsars, machine learning

Superfluidity: multi-fluid magnetohydrodynamics, mesoscopic vortex and fluxtube physics, Gross-Pitaevskii and Ginzburg-Landau-type models, superfluid helium, ultra-cold gases

EDUCATION

PhD, Mathematical Sciences, University of Southampton, UK (Sept 2016)

- *Thesis Title:* Cosmic Condensates – Vortex, Fluxtube and Neutron Star Dynamics
- *Advisor:* Prof. Nils Andersson

Diplom (MPhys), Physics, Eberhard Karls University, Tübingen, Germany (Mar 2012)

- *Major, Minor:* Astronomy & Astrophysics, Quantum Optics
- *Thesis Title:* Dynamics of Superfluid Neutron Stars
- *Advisors:* Dr. Kostas Glampedakis, Prof. Kostas Kokkotas

RESEARCH EXPERIENCE

Postdoctoral Researcher, Institute of Space Sciences (ICE-CSIC, IEEC), Barcelona, Spain (since Jan 2020)

- *Focus:* Developing a new machine learning approach for population synthesis studies of isolated pulsars with a specific focus on magnetars as part of the ERC project [MAGNESIA](#) - The Magnetar Census
- *Advisor:* Dr. Nanda Rea

McGill Space Institute Fellow, McGill University, Montréal, Canada (Oct 2016 – Dec 2019)

- *Focus:* Working on the interface of astrophysics and condensed matter physics by studying implications of superfluid and superconducting components on neutron star observables
- *Advisors:* Prof. Andrew Cumming, Prof. Vicky Kaspi

Doctoral Researcher, General Relativity, University of Southampton, UK (Oct 2012 – Aug 2016)

- *Focus:* Studying properties of superfluid and superconducting neutron star cores and analysing how well-known terrestrial quantum condensates can serve as versatile analogues of neutron stars
- *Advisor:* Prof. Nils Andersson

Undergraduate Research Assistant, Theoretical Astrophysics, Eberhard Karls University, Tübingen, Germany (Mar 2011 – Mar 2012)

- *Project:* Developing a model for the response of the neutron star core following a spin glitch that accounts for viscous and magnetic coupling as well as vortex-mediated mutual friction
- *Advisors:* Dr. Kostas Glampedakis, Prof. Kostas Kokkotas

Undergraduate Research Assistant, Theoretical Solid State Physics, Eberhard Karls University, Tübingen, Germany (July 2009 – Dec 2010)

- *Project:* Calculating magnetic field distributions of rectangular superconductors using conformal mapping with the aim to optimise designs of microtraps for ultra-cold atomic gases
- *Advisor:* Prof. Thomas Dahm

RESEARCH EXPERIENCE (CONTINUED)

Intern, Institute of Planetary Research, DLR, Berlin, Germany (July – Aug 2009)

- *Project*: Recording and analysing Raman spectra of rock samples to assess the spectrometer's stability and developing criteria for a database of Mars analogue material
- *Advisor*: Dr. Ute Böttger

Intern, EADS Astrium GmbH, Friedrichshafen, Germany (Aug – Sept 2006)

- *Project*: Calculating the Earth's magnetic field to study its influence on clocks as part of the Atomic Clock Ensemble in Space mission aimed at better measuring gravity's effects on time
- *Advisor*: Dr. Achim Seidel

FELLOWSHIPS, HONOURS AND AWARDS

- **McGill Space Institute Postdoctoral Fellowship**, McGill University (Oct 2016 – Aug 2019)
- **Participant at the 69th Lindau Nobel Laureate Meeting dedicated to Physics** (July 2019)
(nominated by Nobel Laureate Dr. Arthur McDonald and selected in a worldwide competition)
- **First Poster Prize**, voted by the participants of the 69th Lindau Nobel Laureate Meeting (July 2019)
- **International Visitor Grant**, [OzGrav](#), Australia (Nov – Dec 2018)
- **PhD Scholarship**, Evangelisches Studienwerk e.V. Villigst (Jan 2013 – Dec 2015)
- **Vice Chancellor Scholarship**, University of Southampton (Oct 2012 – Oct 2015)
- **Best Student Talk Prize**, Annual NewCompStar Conference, Budapest (June 2015)
- **SET for BRITAIN finalist**, poster competition in the UK Parliament, London (Mar 2015)
- **PhD Scholarship**, German Academic Exchange Service (DAAD) (Nov – Dec 2012)

INVITED COLLOQUIA, SEMINARS, TALKS AND LECTURES

- **Talk**, Journal Club, CAMK, Warsaw, Poland (May 2021) (online)
- **Seminar**, Hadronic, Nuclear & Atomic Physics Group, University of Barcelona, Spain (Mar 2021) (online)
- **Talk**, Neutron Star Group Meeting, University of Southampton, UK (Nov 2020) (online)
- **Webinar**, Fluids ECR Forum, University of Leeds, UK (Nov 2020) (online)
- **Astronomy Seminar**, Stony Brook University, New York (Nov 2020) (online)
- **Colloquium**, Research Training Group – Models of Gravity, Oldenburg, Germany (July 2020) (online)
- **Seminar**, IRAP, Toulouse, France (June 2020) (online)
- **Physics Colloquium**, Texas A&M Commerce, Texas (Feb 2020)
- **Lecture**, CRAQ Summer School, Montréal, Canada (June 2019)
- **Talk**, ICONS, JINA – CEE Workshop, University of Amsterdam, Netherlands (Apr 2019)
- **Talk**, *Quantum Turbulence*, INT Workshop, Seattle, Washington (Apr 2019)
- **Talk**, *Mini-Symposium on GWs and QCD*, Goethe University, Frankfurt, Germany (Jan 2019)
- **Astrophysics Colloquium**, Swinburne University, Melbourne, Australia (Nov 2018)
- **Astrophysics Seminar**, University of Melbourne, Australia (Nov 2018)
- **GW Group Meeting**, Monash University, Melbourne, Australia (Nov 2018)
- **Superfluid Seminar**, Newcastle University, UK (Apr 2018)
- **MHD Seminar**, Durham University, UK (Apr 2018)
- **Astrophysics Seminar**, McGill University, Montréal, Canada (Mar 2018)
- **Astrophysics Seminar**, Newcastle University, UK (Jan 2018)
- **Gravity Seminar**, University of Southampton, UK (Jan 2018)
- **Condensed Matter & Astrophysics Seminar**, Northwestern University, Evanston, Illinois (Nov 2017)
- **Physics Colloquium**, Kent State University, Ohio (Nov 2017)

ADDITIONAL SEMINARS, TALKS AND POSTERS

- **Talk**, EAS Meeting 2020, (June 2021) (online)
- **Pizza Seminar**, Institute of Space Sciences (ICE-CSIC), Barcelona, Spain (Nov 2020) (online)
- **Talk**, Physics of Neutron Stars 2020, St. Petersburg, Russia (July 2020) (cancelled due to Covid-19)
- **Talk**, Annual PHAROS Conference, Patras, Greece (Mar 2020) (cancelled due to Covid-19)
- **Talk**, MAGNESIA Kick-Off Meeting, Institute of Space Sciences (ICE-CSIC), Barcelona (Nov 2019)
- **Talk**, COSPAR 42nd Assembly, Pasadena, California (July 2018)
- **Talk**, PHAROS WG2 Meeting, CAMK, Warsaw, Poland (Apr 2018)
- **Talk**, *Neutron Star Crusts*, JINA – INT Workshop, Seattle, Washington (Nov 2017)
- **Talk**, *New Perspectives on Neutron Star Interiors*, ECT* Workshop, Trento, Italy (Oct 2017)
- **Talk**, Trottier Family Foundation Showcase, McGill University, Montréal, Canada (Sept 2017)
- **Talk**, SMFNS2017, Havana/Varadero, Cuba (May 2017)
- **Talk**, AstroGrav Pizza Lunch, University of Southampton, UK (June 2016)
- **Talk**, Annual NewCompStar Conference, Budapest, Hungary (June 2015)
- **Talk**, BritGrav15, University of Birmingham, UK (Apr 2015)
- **Talk**, *Observations & Theory in the Dynamics of NS*, ECT* Workshop, Trento, Italy (Jan 2015)
- **Applied Maths Postgraduate Seminar**, University of Southampton, UK (Dec 2014)
- **Talk**, BritGrav14, University of Cambridge, UK (Mar 2014)
- **Poster**, School on Gravitational Waves, Banach Center, Warsaw, Poland (July 2013)
- **Applied Maths Postgraduate Seminar**, University of Southampton, UK (June 2013)
- **GR & Astrophysics Seminar**, Eberhard Karls University, Tübingen, Germany (Apr 2012)

TEACHING EXPERIENCE

Lecturer, Institute of Space Sciences (ICE-CSIC, IEEC), Barcelona, Spain (July 2021)

- *Course*: ICE Annual Summer School on ‘Artificial Intelligence for Astronomy’ (graduate level)
- *Responsibilities*: Design lecture content on the topic of ‘Neural Networks’ and hands-on exercises on ‘An Introduction to ML - Clustering Algorithms’ for a school targeted at master and PhD students

Lecturer, Faculty of Sciences, Autonomous University of Barcelona, Spain (May 2021)

- *Course*: Neutron Stars, Black Holes & Gravitational Waves (graduate level)
- *Responsibilities*: Design lecture content and exercises for the above module as part of master’s program on ‘High Energy Physics, Astrophysics & Cosmology’; I covered the section on black hole theory.

Lecturer, Department of Physics, McGill University, Montréal, Canada (June 2019)

- *Course*: CRAQ Annual Summer School on ‘Stellar Astrophysics’
- *Responsibilities*: Design lecture content on the topic of ‘Stellar Death - Neutron Stars’ and a hands-on exercise on ‘Mass-radius Relations’ for a school targeted at master and PhD students

Lecturer, Department of Physics, McGill University, Montréal, Canada (Jan – Apr 2019)

- *Course*: PHYS 434 Optics (undergraduate level)
- *Responsibilities*: Design content, homework and exams, lecture and grade as the lead instructor

Guest Lecturer, Department of Physics, McGill University, Montréal, Canada (Sept – Oct 2018)

- *Courses*: PHYS 352 Electromagnetic Waves, PHYS 521 Astrophysics (undergraduate level)
- *Responsibilities*: Cover lectures on ‘Light propagation in media’ and ‘Compact binaries’

Instructor, Department of Physics, McGill University, Montréal, Canada (Sept – Dec 2017)

- *Course*: PHYS 632 Seminar in Astrophysics (graduate-level reading course)
- *Responsibilities*: Choose reading material on the topic of ‘Astrophysical Transients’, stimulate discussions and answer questions, grade students

TEACHING EXPERIENCE (CONTINUED)

Guest Lecturer, Department of Physics, McGill University, Montréal, Canada (Mar 2017)

- *Course*: PHYS 432 Physics of Fluids (undergraduate level)
- *Responsibilities*: Give an introduction to superfluids and their role in neutron star astrophysics

Teaching Assistant, Mathematical Sciences, University of Southampton, UK (Oct 2012 – May 2016)

- *Courses*: MATH1007 Mathematical Methods For Physical Scientists, MATH1050 Maple Labs, MATH1052 Differential Equations, MATH2045 Vector Calculus & Complex Variables, MATH3006 Relativity, Black Holes & Cosmology (undergraduate level)
- *Responsibilities*: Run weekly problem classes, answer questions, mark coursework and tests

Undergraduate Teaching Assistant, Institute of Astronomy & Astrophysics, Eberhard Karls University, Tübingen, Germany (Mar 2011 – Apr 2012)

- *Course*: VFHAP High Energy Astrophysics, VFKOS Observational Cosmology (graduate level)
- *Responsibilities*: Create electronic lecture notes for the instructor Prof. Andrea Santangelo

Undergraduate Teaching Assistant, Institute of Physics, Eberhard Karls University, Tübingen, Germany (Oct 2008 – Apr 2012)

- *Course*: PP2 Experimental Physics II (undergraduate level)
- *Responsibilities*: As an instructor for five optics experiments, I maintained the equipment, gave a one-hour lecture for each experiment, supervised the students and marked their reports.

VISITING SCIENTIST

- Aspen Center for Physics, Aspen, Colorado (Sept 2019)
- OzGrav Visitor, Monash University / University of Melbourne, Australia (Nov – Dec 2018)
- School of Mathematics, Statistics and Physics, Newcastle University, UK (Jan and Apr 2018)

MENTORING EXPERIENCE

Mentor, Evangelisches Studienwerk e.V. Villigst (since Oct 2020)

- *Responsibilities*: Mentor for a female physics undergraduate student at the University of Edinburgh

Co-supervisor, Institute of Space Sciences (ICE-CSIC, IEEC), Barcelona, Spain (since Jan 2020)

- *Responsibilities*: Official co-supervisor of PhD student Michele Ronchi working on pulsar population synthesis and informal supervisor of PhD student Clara Dehman working on magneto-thermal neutron star simulations within the ERC project MAGNESIA

Supervisor, Institute of Space Sciences (ICE-CSIC, IEEC), Barcelona, Spain (Feb - June 2021)

- *Responsibilities*: Official supervisor of one undergraduate student working on pulsar population synthesis within the ERC project MAGNESIA

Co-supervisor, Institute of Space Sciences (ICE-CSIC, IEEC), Barcelona, Spain (Nov 2020 - July 2021)

- *Responsibilities*: Official co-supervisor of master student Marco Ermolli who is studying the impact of superfluidity / superconductivity and relevant microphysics on neutron star cooling

Supervisor, Department of Physics, McGill University, Montréal, Canada (Jan – November 2019)

- *Responsibilities*: Primary mentor for two undergraduate students and one master student working on neutron star astrophysics related research projects

Instructor, McGill Space Institute, McGill University, Montréal, Canada (May – Sept 2019)

- *Topics*: ‘Interacting with your research group’, ‘Applying for grad school’, ‘Non-academic careers’
- *Responsibilities*: Organise and run personal development workshops for undergraduates

MENTORING EXPERIENCE (CONTINUED)

Instructor, McGill Space Institute, McGill University, Montréal, Canada (May – Sept 2018)

- *Topics*: ‘Talking to your research advisor’, ‘Highs & lows of research’, ‘Non-academic careers’
- *Responsibilities*: Organise and run personal development workshops for undergraduates

Supervisor, Department of Physics, McGill University, Montréal, Canada (May – Sept 2017)

- *Responsibilities*: Primary mentor for one undergraduate summer student writing Python code to calculate model equations of state for the neutron star interior

PROFESSIONAL SERVICES

- **Member**, European Astronomical Society ([EAS](#)) (since Mar 2021)
- **Member**, Inclusion, Diversity, and Equity in European Astronomy ([IDEEA](#)) (since Feb 2021)
- **Member**, International Research Network for Nuclear Astrophysics ([IReNA](#)) (since Feb 2020)
- **Member**, Joint Institute for Nuclear Astrophysics ([JINA – CEE](#)) (since Feb 2019)
- **Member**, Square Kilometre Array ([SKA](#)) Pulsar Working Group (since Jan 2018)
- **Member**, [PHAROS](#) (European COST Action CA16214) (since Nov 2017)
- **Referee**, A&A, APSS, MNRAS, PRL, grant proposals (since May 2017)
- **Member**, Institute of Physics ([IoP](#)) (since Oct 2014)
- **Member**, German Physical Society ([DPG](#)) (since Jan 2010)
- **SOC**, [Annual PHAROS Conference](#), Patras, Greece (Mar 2020)
- **Convener**, [30th Texas Symposium on Relativistic Astrophysics](#), Portsmouth, UK (Dec 2019)
- **Member**, Le Centre de recherche en astrophysique du Québec ([CRAQ](#)) (Oct 2016 – Dec 2019)
- **Member**, [NewCompStar](#) (European COST Action MP1304) (Nov 2013 – Nov 2017)

DEPARTMENTAL SERVICES

- **Chair**, Pizza Seminars, Institute of Space Sciences (ICE-CSIC) (since Oct 2020)
- **Member**, Equity Committee, Institute of Space Sciences (ICE-CSIC) (since Sept 2020)
- **Organiser**, Machine Learning Journal Club, Institute of Space Sciences (ICE-CSIC) (since July 2020)
- **Member**, AstroMcGill (McGill Space Institute Outreach Team) (Oct 2016 – Dec 2019)
- **Co-organiser**, McGill Space Institute Student Workshops, McGill University (May – Aug 2019)
- **Co-organiser**, McGill Space Institute Seminars, McGill University (June 2017 – May 2019)
- **Organiser**, Postdoctoral Personal Development Workshops, McGill University (Aug – Dec 2018)
- **Co-organiser**, McGill Space Institute Student Workshops, McGill University (May – Aug 2018)
- **Organiser**, Applied Maths Postgraduate Seminar, University of Southampton (Oct 2014 – Aug 2016)

OUTREACH

- Virtual secondary school talk on *Being a Theoretical Astrophysicist* for the [100tifiques](#) initiative on the International Day of Girls and Women in Science, Barcelona, Spain (Feb 2021) (online)
- Webinar on *Neutron Stars – The Strongest Magnets in the Universe* as part of NASA’s [Universe of Learning](#) program, USA (October 2020) (online)
- Public lecture on *Wenn Neutronensterne Schluckauf haben* (in German) as part of the [Faszination Astronomie Online](#) series, Haus der Astronomie, Heidelberg, Germany (July 2020) (online)
- Public lecture on *Neutron Stars – Extraordinary Cosmic Laboratories* for SEDS Celestia (Astronomy & Astrophysics Club, BITS Pilani - K. K. Birla Goa Campus), Goa, India (July 2020) (online)
- Public lecture on *Neutron Stars – Extraordinary Cosmic Laboratories* as part of the [Public AstroNight](#) series, AstroMcGill, Montréal, Canada (Dec 2018)
- Science Storytelling Slam hosted by the [Broad Science](#) Initiative, Montréal, Canada (Nov 2018)
- Mentor and judge at the 3rd Annual McGill Physics Hackathon, Montréal, Canada (Nov 2018)
- Secondary school talk on *Our Solar System*, Schillerschule, Tuttlingen, Germany (Oct 2018)

OUTREACH (CONTINUED)

- **Astronomy on Tap** talk on *Neutron Stars – A Space Odyssey*, Montréal, Canada (Sept 2017)
- Solar eclipse viewing for thousands of spectators, McGill University, Montréal, Canada (Aug 2017)
- Southampton Science and Engineering Festival, University of Southampton, UK (Mar 2016)
- Einstein's Legacy (outreach event for college students), QMUL, UK (Nov 2015)
- Southampton Science and Engineering Day, University of Southampton, UK (Mar 2015)
- The Big Bang Fair (science fair for secondary school students), Birmingham, UK (Mar 2014)
- Southampton Science and Engineering Day, University of Southampton UK (Mar 2013)

ADDITIONAL WRITING

- **Blog post**, 'A Truly Unique Experience' – Review of #LINO19, Lindau Nobel Laureate Meetings (Sept 2019)
<https://www.lindau-nobel.org/blog-review-of-lino19-by-vanessa-graber/>
- **Article**, *The 69th Lindau Nobel Laureate Meeting*, News & Events McDonald Institute (Aug 2019)
<https://mcdonaldinstitute.ca/news/lino19/>
- **Blog post**, *10 Questions with Vanessa Graber*, Women in Research (June 2019)
<https://womeninresearchblog.wordpress.com/2019/06/26/vanessa-germany/>

ADDITIONAL TRAINING

Teaching Techniques for Instructors Workshop, McGill University, Montréal, Canada (Sept 2017)

- *Details*: One day workshop organised by the **T-PULSE Initiative**
- *Topics*: Writing course syllabi, organising content, creating learning objectives, giving feedback

Career and Leadership Development Course, University of Southampton, UK (Feb 2015)

- *Details*: Two-day intensive residential course run by the University's Doctoral College
- *Topics*: Developing a personal leadership style, improving understanding of career planning

Management and Leadership Course, Furtwangen University, Germany (Apr – Sept 2009)

- *Details*: Initiative sponsored by the **Baden-Württemberg Foundation** to support 20 outstanding female STEM students
- *Topics*: Improving management, communication and leadership skills through online training modules and on-site seminars, completing a marketing project in collaboration with a local company

REFERENCES

- Dr. Nanda Rea, Institute of Space Sciences (ICE-CSIC), rea@ice.csic.es
- Prof. Andrew Cumming, McGill University, Montréal, andrew.cumming@mcgill.ca
- Prof. Nils Andersson, University of Southampton, N.A.Andersson@soton.ac.uk
- Prof. Daryl Haggard, McGill University, Montréal, daryl.haggard@mcgill.ca
- Prof. Vicky Kaspi, McGill University, Montréal, vkaspi@physics.mcgill.ca
- Prof. Kostas Kokkotas, Eberhard Karls University, Tübingen, kostas.kokkotas@uni-tuebingen.de