Lieke van Son

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Research Positions

Assistant Professor - Tenure Track (current) — *Nijmegen, The Netherlands*
Institute for Mathematics, Astrophysics and Particle Physics | Radboud University — *Aug 2025 - present*

Flatiron Research Fellow — *New York, USA*
Center for Computational Astrophysics, Flatiron Institute — *Sept 2023 - Aug 2025*

Member of the Society of Fellows — *Princeton, USA*
Princeton University — *Sept 2023 - Aug 2025*

Lyman Spitzer, Jr. Postdoctoral Fellow — *Princeton, USA*
Princeton University — *Sept 2023 - Aug 2025*

International research internship — *Rio de Janeiro, Brazil*
Observatório Nacional - Rio de Janeiro — *Mar. 2017 - Jun 2017*
Advisors: Prof. H Röttgering and Dr. R. A. Overzier, Subject: Probing radio galaxies with MG II absorbers

Education

Ph.D. in Astrophysics — *Cambridge, USA*
Center for Astrophysics | Harvard & Smithsonian — *Jan. 2019 - Awarded May 2023*
Subject: The massive stellar progenitors of gravitational-wave sources

MSc in Astronomy, specialisation: Cosmology — *Leiden, the Netherlands*
Leiden University — *Feb. 2016 - Awarded Jun. 2018*
Advisors: Prof. J. Schaye and C. Barber Msc., Leiden University
Subject: Overmassive black holes in the C-Eagle Simulation

BSc in Astronomy — *Leiden, the Netherlands*
Leiden University — *Sep.2012 - Awarded Jun. 2015*

Grants, Awards, and Honors

Veni, NWO Talent Programme — *August 2025*
3-year personal grant awarded by the Dutch Research Council (NWO) to support independent, cutting-edge research at a Dutch institution; $\sim$ €320K.

NASA Hubble Fellowship program (offer declined) — *2023-2026*
3-year fellowship supporting promising postdoctoral scientists to pursue independent research $\sim$ $225K

Flatiron Institute Pre-Doctoral fellowship — *2021-2022*
5-month PhD internship at the Center for Computational Astrophysics, NYC; incl. 3 months paid housing $\sim$ $7K

Finalist 2023 GWIC-Braccini Prize — *August 2024*
Yearly prize recognizing an outstanding Ph.D. thesis in the field of gravitational waves

Barbara Bell Graduate Student Dissertation Fellowship — *spring 2023*
Yearly award from the Faculty of Arts and Sciences Paid for spring tuition of Harvard GSAS: $\sim$ $5K

Certificate of Distinction In Teaching, Derek Bok Center, Harvard University — *2021*
Rewarded based on graduate student evaluations of teaching.

Special Commendation Derek Bok Center, Harvard University — *2020*
For "special contributions to undergraduate teaching" based on student evaluations.

Notable Invited Talks

I have been invited to over 30 conferences and colloquia. Notable invitations are highlighted below. The full list is on my website.

May. 2027 (upcoming) New Horizons Solvay Lectures in Physics **Lecture series** Solvay Institutes & Belgian universities
Jun. 2026 (upcoming) School of Gravity **Invited Lecturer**, Niels Bohr Institute, Copenhagen
Jun. 2025 Open Problems in Astrophysical Dynamics Invited speaker, Niels Bohr Institute, Copenhagen, Denmark
Mar. 2025 Frontiers of Astrophysical Black Holes Invited speaker, Sexten, Italy
Mar. 2025 Particles vs. New Probes workshop Invited speaker, Center for Computational Astrophysics (CCA), New York City
Dec. 2024 Theoretical Astrophysics Center (TAC) seminar UC Berkeley, Berkeley, USA
Nov. 2024 Canadian Institute for Theoretical Astrophysics CITA Seminar Toronto, Canada
Nov. 2024 University of Pennsylvania Astrophysics seminar, Philadelphia, USA
Jun. 2024 Current Themes in Theoretical Physics **Invited review** talk, Niels Bohr International Academy , Denmark
Jan. 2024 UCLA **Astrophysics colloquium**, Los Angeles, USA
Dec. 2023 RESCEU-NBIA workshop on gravitational-wave sources invited speaker and panellist, Tokyo, Japan
Nov. 2023 University of Maryland, Baltimore County **physics colloquium**, Baltimore, USA
Jul. 2023 Max Planck Institute for Astrophysics Kavli Summer program Invited Seminar, Munich, Ger.
Jul. 2023 Conference '3,2,1: massive triples, binaries and mergers' **Invited review** on populations in the GW context, Leuven
Jun. 2023 Lorentz workshop: **Invited review** on the mass distribution of merging binary black holes, Leiden, NL
Apr. 2023 APS April Meeting 2023 **Invited review** , Physical Review Session on Gravitational Waves
Nov. 2022 Perimeter Institute Strong Gravity Seminar, Canada
Sept. 2022 American Museum of Natural History Seminar at Department of Astrophysics, USA
Dec. 2021 Black Hole Initiative - Harvard University **BHI colloquium**, USA. (recording of talk)
Dec. 2021 State University of New York College - Geneseo **Physics Colloquium**, USA

Teaching activities

Graduate class: 'Advanced Stellar and Binary Evolution', Radboud University - one of two Lead instructors *Fall 2025*
6 month course covering stellar structure, binary interactions and computational methods.
Co-instructor: Dr. Onno Pols

Hackathon: A first taste of MESA – IAU general assembly meeting - Lead instructor *Summer 2024*
Two-day hackathon in South Africa as part of the IAU general assembly. Geared towards both participants and local students. Material is now available online. - **Received AUI/IAU/Heising-Simons Scholarship for this hackathon**

Graduate class: ASTRON 204 'Stellar Astrophysics', Harvard University - Teaching Fellow *Fall 2021*
Instructor: Prof. Charlie Conroy – **Received Certificate of Distinction in Teaching for this class**

Undergraduate class: ASTRON 120 'Stellar Physics', Harvard University - Teaching Fellow *Spring 2020*
Instructor: Prof. Selma de Mink – **Received Special Commendation Derek Bok Center for this class**

Masters class: 'High energy astrophysics', Amsterdam University - Teaching Assistant *Spring 2019*
Instructor: Dr. Phil Uttley

Bachelor class: 'Modern Astronomical Research', Leiden University - Teaching Assistant *Spring 2017*
Instructor: Prof. Simon Portegies Zwart

Student Supervision & Advising

– PhD student Advising –

Soumendra Roy (SUNY Stonybrook) *Sept 2023 - present*
Co-advised (with Prof. W. Farr as primary advisor) on thesis projects exploring cosmological constraints from binary neutron star mergers and gravitational-wave population analyses – currently final-year PhD student.

Lucas de Sá (Universidade de Sao Paulo) *Sept 2024 - present*
Lucas joined the highly competitive 2024 CCA Predoc program in the final-year of his PhD to work with me (co-advised by Prof. Matteo Cantiello) on chemically homogeneous stars and their link to the gravitational-wave population. *– Now Humboldt Fellow at Heidelberg University*.

Gina Chen (Carnegie Mellon University) *March 2024 - present*

First year graduate student project, co-advising with dr. Katie Breivik. Gina is investigating the mass distribution that we expect for GW sources that form through stable mass transfer, building on the models in *van Son et al. ApJ, 940, 184 (2022)*.

– Undergraduate Advising –

Jelle van Beek (Radboud University) *September 2025 – present*

Main advisor on undergraduate project investigating black hole - white dwarf mergers populations

Melanie Santiago (Haverford College) *April 2024 - August 2025*

Main advisor on undergraduate project investigating double white dwarf mergers as type Ia supernova progenitors; started as NSBP Summer Program, continued into her senior year and is now being written up for publication – *Now PhD student at UCSD*

Katie Sharpe (Harvard Astronomy) *Fall 2020 - Fall 2023*

Co-advised on undergraduate project with Prof. Selma de Mink. Her bachelor project on the origin of the observed Wolf-Rayet binary system HD 5980 culminated in a publication in ApJ. – *Now PhD student at Berkely*

Science Communication & Public Engagement

OUTREACH ACTIVITIES AND ORGANISATIONAL ROLES (SELECTION)

Chair of Local Organising Committee, ComSciCon-flagship workshop 2022 *(September 2021 - September 2022)*

Lead team of 20 organisers to realise Communicating Science workshop for graduate students in STEM. This includes setting up application process and reviewing applicants, **managing the $ 60,000 workshop budget** and overseeing the workshop programming.

Member of Leadership Team, ComSciCon *(Jan 2020 - present)*

This science communication workshop for graduate students aims to empower future leaders in science communication. Currently helping to establish relationships and funding with e.g., Harvard University to ensure long-term continuation of ComSciCon.

Exhibition Manager, visitors centre old observatory, leiden, The Netherlands *(April 2016 - Jun 2018)*

Coordinator of the development of a new exhibition for the astronomy visitors' center. Apart from the main exhibition, this included organising and hosting many astronomy related outreach events, such as annual spring lectures and the night of discoveries.

Organiser/Volunteer , Astronomy on Tap *(Feb 2022 - present)* I led the revival of the 'Astronomy on Tap' event in Boston, which hosts free accessible, engaging science presentations on space and science aimed at the general public.

Volunteering Expert, SpaceEU - Space in Your Living Room *(Jul 2020 - Aug 2020)*

Online astronomy summer workshops to engage primary school children during the 2020 COVIDD-19 pandemic.

Member of Public Relations Team , Bring the sun to leiden *(Jan 2015 - Apr 2015)*

Successful project with the goal of buying and installing a heliostat used for public outreach. - Leiden University

Physics Outreach Volunteer. Stichting Rino *Sep 2012 - Sep 2016* promoting STEM careers among high school students. Leiden, NL

PRESS RELEASES, POPULAR MEDIA AND PUBLICATIONS

Symbiosis **2 week film project between scientists and filmmakers.** Filmmaker Kyle Finnegan and I collaborated to create the short film "Who Cares About Gravitational Waves?" - May 2025

OpEd Scientific American **Authored OpEd** "We Just Discovered the Sounds of Spacetime. Let's Keep Listening" - August 2025

Dutch radio dr. Kelder & Co **(NPO radio 1)** "Zwarte gaten, je ziet ze nauwelijks, maar ze zijn er wel" - Sept 2023

Podcast: Daniel and Jorge explain the Universe Hour-long interview for episode "Have we seen more or fewer gravitational waves than expected?" - Aug 2023

Scientific American Interviewed for article "Gravitational-Wave Search Resumes after Three Years and Lots of Headaches" - May 2023

KIJK magazine Interviewed for article "Meest nabije zwarte gat ontdekt" - May 2020

Professional Services

ORGANIZATION OF SCIENTIFIC MEETINGS

SOC MEMBER **KITP workshop: The Dynamic Lives and Deaths of Massive Stars.** *(March-April 2027)*

LEAD ORGANISER **Workshop on Stable mass transfer 2.0** *(May 2025)* Hackathon style follow-up meeting to successful workshop from the previous year.

SCIENTIFIC ORGANISING COMMITTEE **IAU General Assembly Focus Meeting 7:** *New Horizons at the interface between computational astrophysics and big data* *(May 2023 - present)*

LEAD ORGANISER **Workshop on Stable mass transfer: from onset to remnants** *(July 2023 - March 2024)* Spearheaded the proposal, obtained funding, designed and curerntly executing the workshop together with 2 colleagues at the Flatiron institute.

SCIENTIFIC ORGANISING COMMITTEE **Gravitational Waves Physics and Astronomy Workshop 2024** *(July 2023 - present)*

Other professional services (selection)

MEMBER OF ACCESSIBILITY SUBGROUP **CfA Inclusion, Diversity & Equity Alliance** *(Jul 2020 - Jul 2023)*
The goal of the alliance is to improve equity, diversity, belonging, and inclusion through sustained actionable implementation.

EXTERNAL PANELIST **HST Time Allocation Panel in Stellar Populations.** *(spring 2023)* For Cycle 31.

ARETE FELLOW Harvard Effective Altruism organization- 9-week fellowship, Link to Fellowship Details *(Feb. 2021 - May. 2021)*

JOURNAL REFEREE Monthly Notices of the Royal Astronomical Society (MNRAS), The Astrophysical Journal (ApJ), Astronomy & Astrophysics (A&A), Physical Review journals, and Nature Astronomy

INTERNATIONAL COLLABORATIONS

The COMPAS team. As a member of the COMPAS team, I support and contribute to the development of the open-source rapid binary population synthesis code COMPAS (Compact Object Mergers: Population Astrophysics and Statistics). I am co-author on both method papers (Riley et. al 2022; Mandel et al. 2025).

The Einstein Telescope collaboration. Member of the Population Division of the Observation Science Board. Currently co-authoring of Blue Book. Member since May 2023

Cosmic Explorer Consortium. I wrote several science letters for the CE consortium, to respond to the NSF MPSAC Subcommittee on Next-Generation Gravitational-Wave Observatories, co-author on the corresponding publication. Member since fall 2021

LISA Consortium. Member of the LISA Consortium since Fall 2021.

BlackGEM Member since Fall 2023

Coding and other skills

COMPAS: Compact Object Mergers: Population Astrophysics and Statistics. Core-member and co-developer. Co-author on the first and second method papers, implemented several new physics modules. `COMPAS` uses Git as the main tool for review and version control. The code is publicly available at https://github.com/TeamCOMPAS/COMPAS.

MESA Modules for Experiments in Stellar Astrophysics, (http://mesa.sourceforge.net) Taught during multiple advanced stellar evolution courses. Led development of 'MESA Hackathon' during IAU general assembly meeting 2024.

Software development — PYTHON: Expert, this is the main language I use in all my analysis work. — C++: Intermediate proficiency. Main application in COMPAS code. — FORTRAN: Basic working proficiency. Main application in MESA.

Languages

Dutch: Native language – **English**: Fluent – **Spanish**: Intermediate – **German**: Intermediate – **French**: Basic.

References

Name:	Prof. Dr. S. E. de Mink
Institute:	Max Planck Institute for Astrophysics, Garching GER
Connection	PhD Thesis advisor
Contact	sedemink@mpa-garching.mpg.de

Name	Prof. Dr. Charlie Conroy
Institute	Center for Astrophysics, Harvard, Cambridge USA
Connection	Advisor at Harvard
Contact	cconroy@cfa.harvard.edu

Name	Assistant Prof. Dr. Maya Fishbach
Institute	Canadian Institute for Theoretical Astrophysics, University of Toronto, Canada.
Connection	External collaborator
Contact	fishbach@cita.utoronto.ca

Name	Prof. Dr. Will Farr
Institute	Stony Brook University and the Center for Computational Astrophysics, USA
Connection	Collaborator and Postdoctoral mentor
Contact	wfarr@flatironinstitute.org

Publication Record – Lieke van Son

My full list of publications can also be found on the SAO/NASA Astrophysics Data System.

First- and second-authored publications

11. Roy, Soumendra Kishore ; **van Son, Lieke A. C.** ; Farr, Will M.
"A Mid-Thirties Crisis: Dissecting the Properties of Gravitational Wave Sources Near the 35 Solar Mass Peak", arXiv:2507.01086 (2025)

10. **L.A.C. van Son;** Roy, S. K.; Mandel, I.; Farr, W. M.; Lam, A.; Merritt, J.; Broekgaarden, F. S.; Sander, A. ; Andrews, J. J.
"Not just winds: why models find binary black hole formation is metallicity dependent, while binary neutron star formation is not", ApJ, Vol. 979, 2, id.209 (2025)

9. Roy, Soumendra Kishore ; **van Son, Lieke A. C.** ; Ray, Anarya ; Farr, Will M.
"Cosmology with Binary Neutron Stars: Does Mass–Redshift Correlation Matter?", ApJ Letters, 985, L33 (2025)

8. K. Sharpe; **L.A.C. van Son;** S. E. de Mink; R. Farmer; P. Marchant; G. Koenigsberger
" Investigating the Chemically Homogeneous Evolution Channel and its Role in the Formation of the Enigmatic Binary Black Hole Progenitor Candidate HD 5980 ", ApJ, Vol. 966, 1, (2024),

7. Hendriks, D. D.; **van Son, L. A. C**; Renzo, M.; Izzard, R. G. ; Farmer, R.
"Pulsational pair-instability supernovae in gravitational-wave and electromagnetic transients", MNRAS, Vol. 526, 3, (2023),

6. Fishbach, Maya & **van Son, Lieke**
"LIGO-Virgo-KAGRA's Oldest Black Holes: Probing star formation at cosmic noon with GWTC-3", ApJ Letters, Vol. 957, 2, id.L31, (2023),

5. **van Son, L. A. C.;** de Mink, S. E.; Chruslinska, M. ; Conroy, C. ; Pakmor, R. ; Hernquist, L.,
"The locations of features in the mass distribution of merging binary black holes are robust against uncertainties in the metallicity-dependent cosmic star formation history.", ApJ, 948, 105 (2023) ,

4. **van Son, L. A. C.;** de Mink, S. E; Renzo, M.; Justham, S.; Zapartas, E.; Breivik, K. ; Callister, T. ; Farr, W. M. ; Conroy, C.
"No peaks without valleys: The stable mass transfer channel for gravitational-wave sources in light of the neutron star-black hole mass gap.", ApJ, 940, 184, (2022),

3. **van Son, L. A. C.;** de Mink, S. E; Callister, T.; Justham, S.; Renzo, M.; Wagg, T.; Broekgaarden, F.; Kummer,F.; Pakmor, R.; Mandel,I.
"The redshift evolution of the binary black hole merger rate: a weighty matter ", ApJ, 931 17,(2022)

2. **van Son, L. A. C.;** de Mink, S. E; Broekgaarden, F. S.; Renzo, M.; Justham, S.; Laplace, E.; Morán Fraile, J. Hendriks, D. D.; R. Farmer, *"Polluting the pair-Instability mass gap with super-Eddington accretion in binary systems"*, ApJ, 897 100, (2020)

1. **van Son, L. A. C.;** Barber, C.; Bahé, Y. M.; Schaye, J.; Barnes, D. J.; Crain, R. A.; Kay, S. T.; Theuns, T.; Dalla Vecchia, C.,
"Galaxies with monstrous black holes in galaxy cluster environments", MNRAS, 485 396, (2019)

Co-authored publications

19. Fishbach, M.; Breivik, K.; Willcox, R.; **van Son, L. A. C.**; and co-authors
"Where are Gaia's small black holes?", arXiv:2508.08986 (2025)

18. Willcox, R.; Marchant, P.; Vigna-Gomez, A.; **van Son, L. A. C.**; and co-authors
"Binarity at LOw Metallicity (BLOeM): Bayesian inference of natal kicks from inert black hole binaries", A&A, 700, A59 (2025)

17. Merritt, J. D.; Stevenson, S.; Sander, A.; **van Son, L. A. C.**; and co-authors
"Implications of modern mass-loss rates for massive stars", arXiv:2507.17052 (2025)

16. Vigna-Gomez, A.; Grishin, E.; Stegmann, J.; **van Son, L. A. C.**; and co-authors
"Prompt stellar and binary black hole mergers in tight triples: Insights from chemically homogeneous evolution", A&A, 699, A272 (2025)

15. Mandel, I.; Riley, J.; Boesky, A.; **van Son, L. A. C.**; and co-authors
"Rapid stellar and binary population synthesis with COMPAS: methods paper II", arXiv:2506.02316 (2025)

14. Lechien, T.; de Mink, S. E.; Valli, R.; **van Son, L. A. C.**; and co-authors
"Binary stars take what they get: Evidence for Efficient Mass Transfer from Stripped Stars with Rapidly Rotating Companions", arXiv:2505.14780 (2025)

13. Abac, A.; Abramo, R.; Albanesi, S.; **van Son, L. A. C.**; and many co-authors
"The Science of the Einstein Telescope", arXiv:2503.12263 (2025)

12. Renzo, M.; Hendriks, D. D.; **van Son, L. A. C.**; and co-authors
"Pair-instability Mass Loss for Top-down Compact Object Mass Calculations", Research Notes of the AAS, 6, 25 (2022)

11. Compas Team; Riley, J.; Agrawal, P.; **van Son, L. A. C.**; and co-authors
"COMPAS: A rapid binary population synthesis suite", JOSS, 7, 3838 (2022)

10. Shenar, T. et al., (w/ 77 further co-authors including **van Son, L. A. C.**)
'Binarity at LOw Metallicity (BLOeM): A spectroscopic VLT monitoring survey of massive stars in the SMC' arXiv:2407.14593 (2024)
Contribution: part of the BLOeM collaboration.

9. Stegmann et al., (w/ 8 further co-authors including **van Son, L. A. C.**)
'Close Encounters of Wide Binaries Induced by the Galactic Tide: Implications for Stellar Mergers and Gravitational-wave Sources', ApJL 972 L19 (2024)
Contribution: Collaborator involved in initial discussions and providing input on multiple draft versions.

8. Evans, Matthew, (w/ 75 further co-authors including **van Son, L. A. C.**)
'Cosmic Explorer: A Submission to the NSF MPSAC ngGW Subcommittee ", arXiv:2306.13745 (2023)
Contribution: reviewed and commented on sections of the white paper, in particular related to the science goal: 'Black Holes and Neutron Stars Throughout Cosmic Time'.

7. Ruediger Pakmor, (w/ 8 further co-authors including **van Son, L. A. C.**)
"Formation and fate of low-metallicity stars in TNG50", MNRAS, 512 3602 (2022)
Contribution: I was involved in the initial discussion about what topics would be most interesting to address in this work. I further provided general feedback and comments on the manuscript.

6. Broekgaarden, F. S. et al., (w/ 11 further co-authors including **van Son, L. A. C.**),
"Impact of Massive Binary Star and Cosmic Evolution on Gravitational Wave Observations II: Double Compact Object Mergers", MNRAS stac1677 (2022)
Contribution: In depth conversations with first author about the best way to display the large sets of simulations conducted for this work. This included discussions about the structure and setup of the main figures in the paper.

5. Wagg, Tom ; Broekgaarden, Floor S. ; de Mink, Selma E. ; **van Son, Lieke A. C.** ; Frankel, Neige ; Justham, Stephen
"Gravitational wave sources in our Galactic backyard: Predictions for BHBH, BHNS and NSNS binaries detectable with LISA", ApJ, Vol. 937, Issue 2, id.118 (2022)
Contribution: Helped with the interpretation of the properties of detectable systems as predicted by this work. Generally provided feedback and support to main author and contributed detailed comments on the manuscript draft.

4. Naidu, Rohan P. (w/ 12 further co-authors including **van Son, L. A. C.**)
"Evidence from Disrupted Halo Dwarfs that r-process Enrichment via Neutron Star Mergers is Delayed by $\geq$ 500Myrs", ApJL 926 L36 (2022)
Contribution: Provided the input for the discussion on the scientific significance of the inferred delay time for binary neutron star enrichment in comparison to the merger delay times from stellar population synthesis.

3. **COMPAS team** et al. (w/ 21 further co-authors including **van Son, L. A. C.**)
"Rapid stellar and binary population synthesis with COMPAS" , ApJS 258 34 (2022)

Contribution: Writing and detailed comments to sections 3 'Single Stellar Evolution' and section 4 'Binary Stellar Evolution', and 7 'Usage Examples'. Provided general comments on the rest of the manuscript throughout several feedback rounds.

2. Law-Smith, J., A., P.; (w/ 12 further co-authors including **van Son, L. A. C.**)
   "Successful Common Envelope Ejection and Binary Neutron Star Formation in 3D Hydrodynamics.",
   arXiv:2011.06630 (Subm. to ApJ)
   Contribution: Provided input on the discussion surrounding Roche lobe overflow as discussed around Figure 1. Furthermore provided general feedback and comments on the manuscript.

1. Renzo, M.; Callister, T.; Chatziioannou, K.; **van Son, L. A. C.;** Mingarelli, C., M., F.; Cantiello, M.; Ford, K., E., S.; McKernan, B.; and Ashton, G.,
   "Prospects of gravitational-waves detections from common-envelope evolution with LISA" , ApJ, 919 128 (2021)
   Contribution: This project was born out of the LISA sprint, held at the Flatiron institute. I was among the original group that devised this project during the sprint meeting, and have as such contributed significantly to the shaping of this project. I have written Section 2 and produced the corresponding Figure 2.