Lieke van Son

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Education

PhD candidate in Astrophysics (Joint degree) — *Cambridge, USA – Amsterdam, NL*

Center for Astrophysics | Harvard & Smithsonian – University of Amsterdam — *Jan. 2019 - expected: spring 2023*

MSc in Astronomy, Cosmology — *Leiden, the Netherlands*

Leiden University — *Feb. 2016 - Awarded Jun. 2018*

BSc in Astronomy — *Leiden, the Netherlands*

Leiden University — *Sep.2012 - Awarded Jun.2016*

Research Experience

PhD candidate (joint degree) — *Cambridge, USA – Amsterdam, NL*

Center for Astrophysics | Harvard & Smithsonian – University of Amsterdam — *Jan 2019 - present*

Advisors: Prof. S.E. de Mink, UvA/MPA - Garching. and Prof. C. Conroy, CfA - Harvard University

Subject: The massive stellar progenitors of gravitational-wave sources

Guest researcher and Pre-doctoral Fellow — *New York, USA*

Center for Computational Astrophysics - Simons Foundation — *Sep. 2021 - Oct. 2021*

Advisor: Prof. W. M. Farr, Stoney Brook University, USA

Subject: Understanding observed features in the black hole mass distribution

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

MSc thesis research Project — *Leiden, The Netherlands*

Leiden University — *Feb. 2016 - Dec. 2016*

Advisors: Prof. J. Schaye and C. Barber Msc., Leiden University. Subject: Overmassive black holes in the C-Eagle Simulation

Grants, Awards, and Honors

Flatiron Institute Pre-Doctoral fellowship — *2021-2022*

5 month fellowship including housing in NYC at the Center for Computational Astrophysics

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 contribution to undergraduate teaching" based on student evaluations for courses taught during the pandemic.

Oxford Hinze PhD fellowship (declined) — *2018*

PhD scholarship (3.5 years, Oxford University)

Janneke Fruin-Helb Grant — *2017*

Nominated for most exceptional grant proposal

National and international travel grants

$ 700,-, the American Astronomical Society, 2020; $ 750,-, Graduate School of Arts and Sciences Student Council Conference Grant, 2022; *€200,-* J.C.Kapteyn foundation, 2019; *€1000,-* Leids Universiteits Fonds, 2017

Publication Record

First-authored publications

-10- **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)

-9- **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)

-8- **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 papers

-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)

-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)

-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"*, arXiv:2111.13704 (Subm. to ApJ)

-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)

-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)

-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)

-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)

– Renzo, M.; Hendriks, D. D.; **van Son, L. A. C.;** Farmer, R. *"Pair-instability Mass Loss for Top-down Compact Object Mass Calculations"*, Res. Notes AAS, 6 25 (2022)

Invited and Contributed Talks

Invited

Apr. 2022 Tel Aviv University Astrophysics Seminar, Israel

Mar. 2022 Inst. for Theory and Computation - Harvard University, ITC luncheon, USA. (recording of talk)

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

Apr. 2021 Tufts University Astronomy Seminar, USA

Oct. 2020 Massachusetts Institute for Technology, Brown Bag lunch Talk, USA

Aug. 2020 Universidad de Concepción, Concepción, Astronomy Seminar, Dep. de Astronomia, Chile

Dec. 2019 Lorentz workshop - Leiden University *Lead Discussion Session:* "Black Holes in the Pair Instability mass gap", Netherlands

Contributed

Jun. 2022 **Pre-doc symposium: Center for Computational Astrophysics,** Contrib. talk, CCA, New York, USA

Jun. 2022 **Workshop: 'Black Hole Dynamics: From Gaseous Environments to Empty Space'** Contrib. talk, NBIA, Denm.

May 2022 **Conference: 'Intermediate-mass black holes, from stellar evolution to cosmology'** Contrib. talk, Puerto Rico (COVID)

Dec. 2021 **Conference: 'The Gravitational Wave Physics and Astronomy Workshop'** Contrib. talk, Hannover, Germany

Dec. 2021 **Amsterdam University,** Invited to discuss recent work at SeBa group, Netherlands

Dec. 2021 **Cosmic Explorer Consortium - Science call,** (online)

Nov. 2021 **Outreach Seminar: Beacon Hill seminar series,** "Unveiling the Cosmos", Boston, MA, USA

July 2021 **Max-Planck-Gesellschaft, Ringberg retreat,** Contributed talk, Kreuth, Germany

July 2021 **European Astronomical Society** Contrib. talk, Session 9: The Birth, Life, and Death of Black Holes, Leiden University, NL

May 2021 **IAUS 361: Massive Stars Near & Far,** Contrib. talk, Dublin, Ireland

Mar. 2021 **VLT-FLAMES Massive Star consortium meeting,** Contributed talk, Heidelberg Institute for Theoretical Studies, Ger.

Feb. 2021 **43rd COSPAR Scientific Assembly,** Contrib. talk, Sydney, Australia

Sep. 2020 **Annual meeting of the German Astronomical Society,** Contrib. talk, Heidelberg, Germany

Sep. 2017 **The Young European Radio Astronomers Conference,** Contrib. talk, Bologna, Italy

Further Conferences/workshops attended

Aug. 2022 **Conference: PAX 2022,** MIT, Cambridge, USA

May 2022 **Conference: "IAUS 361: Massive Stars Near & Far",** Ballyconnell, Ireland

Mar. 2022 **Kavli Institute for Theoretical Physics program - invited as an affiliate**
"Bridging the Gap: Accretion and Orbital Evolution in Stellar and Black Hole Binaries," Santa barbara, USA

May 2021 **Lorentz Workshop:** "Gravitational-Wave Astrophysics for Early Career Scientists", Leiden NL

Oct. 2020 **Center for Computational Astrophysics workshop** "AGN Disks: Where the wild Things Are" , New York, USA

Jan. 2020 **Center for Computational Astrophysics workshop:** "LISA astronomy sprint meeting", New York, USA

Jul. 2020 **European Astronomical Society meeting, EWASS,** Poster presentation, Leiden, NL

Jun. 2019 **KITP conference,** "Exploring Compact-Object Binaries with Gravity and Light", UC Santa Barbara USA

Jun. 2019 **BlackGEM Science meeting,** telescope array at the ESO La Silla Observatory , Nijmegen, NL

May 2019 **VLT-Flames Tarantula Survey (VFTS),** general consortium meeting, Edinburgh, UK

May 2019 **Lorentz workshop,** "Electron-Capture-Initiated Stellar Collapse", Leiden, NL

May 2019 **PHAROS PhD Training School,** "Multi-messenger physics and astrophysics with compact binaries", Jena, GER

Teaching & Advising

Teaching

Teaching Fellow, Graduate class ASTRON 204: 'Stellar Astrophysics', Harvard University *Fall 2021*
Instructor: Prof. Charlie Conroy

Teaching Fellow, Undergraduate class ASTRON 120: 'Stellar Physics', Harvard University *Spring 2020*
Instructor: Prof. Selma de Mink

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

Undergraduate Advising

Katie Sharpe (Harvard Astronomy) *Fall 2020 -*

Co-advised on Sophomore project with Prof. Selma de Mink, one paper to be submitted.

Tom Wagg (Harvard Astronomy) *Spring 2020*

mentored and co-advised for Junior thesis, published two papers

Outreach and Public service

Leadership Roles in Outreach

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 budget and overseeing the workshop programming.

Exhibition project 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.

Outreach & Professional Service promoting Diversity, Equity and Inclusion

Member of accessibility subgroup , CfA Inclusion, Diversity & Equity Alliance *(Jul 2020 - present)*

The goal of the alliance is to improve equity, diversity, belonging, and inclusion through sustained actionable implementation.

Member of Organising and leadership committee, ComSciCon *(Jan 2020 - present)*

This science communication workshop for graduate students aims to empower future leaders in science communication. As such, we place a large emphasis on diversity equity inclusion and belonging, example workshops from this years' conference include "Diversity in SciComm" and "Disability in STEM".

Volunteering expert, spaceEU - Space in Your Living Room *(Jul 2020 - Aug 2020)*

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

Member of Public Relations Team , Bring the Sun to Leiden, Leiden University *(Jan 2015 - Apr 2015)*

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

Miscellaneous Professional Services

- Journal referee for the Monthly Notices of the Royal Astronomical Society (MNRAS).
- Served on Colloquium selection committee for the Center for Astrophysics *(Sep. 2020 - May 2022)*
- Promoting vibrant graduate student community by representing graduate students in a request for a new graduate student lounge. *(Jul. 2020 - present)*
- Arete fellow - 9 week fellowship involving readings, discussions, writing and research as part of the Harvard Effective Altruism organisation. *(Feb. 2021 - May. 2021)*
- Encouraging a positive workplace culture by establishing a departmental-wide weekly social gathering ('the Borrel') that continues to this day. *(Jan. 2019 - Jun. 2019)*

Coding and other skills

Astrophysical Codes

– COMPAS: Compact Object Mergers: Population Astrophysics and Statistics (http://compas.science) *Proficiency:* Advanced User and Co-developer, Contributions as co-developer: Implemented several new physics modules and co-author on the method paper. `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) *Proficiency:* Applied for massive star and binary star science applications, able to run grids. Invited as Teaching assistant for the MESA summer school, but postponed.

Computing

- Python: *Proficiency:* This is the main language I use in all my analysis work. I coded several custom routines to simulate and analyze simulations for gravitational-wave progenitors. Advanced plotting and data visualization.
- C++: *Proficiency:* Intermediate proficiency. Main application in COMPAS code.
- Fortran: *Proficiency:* Basic working proficiency. Used when making adaptations to 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 & UvA, Amsterdam NL
Connection	Primary PhD Thesis advisor
Contact	sedemink@mpa-garching.mpg.de

Name	Prof. Dr. S. Justham
Institute	School of Astronomy & Space Science, (UCAS), Beijing CN
Connection	Co-advisor and collaborator
Contact	s.justham@uva.nl

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

Name	Prof. Dr. L. Hernquist
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Connection	Advisor at Harvard
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