

Lieke van Son

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Education

PhD candidate in Astronomy (Joint degree)

CENTER FOR ASTROPHYSICS | HARVARD & SMITHSONIAN – UNIVERSITY OF AMSTERDAM

Cambridge, USA – Amsterdam, NL

Jan. 2019 - expected: spring 2023

MSc in Astronomy, Cosmology

LEIDEN UNIVERSITY

Leiden, the Netherlands

Feb. 2016 - Awarded Jun. 2018

BSc in Astronomy

LEIDEN UNIVERSITY

Leiden, the Netherlands

Sep. 2012 - Awarded Jun. 2016

Research Experience

PhD candidate (*joint degree*)

CENTER FOR ASTROPHYSICS | HARVARD & SMITHSONIAN – UNIVERSITY OF AMSTERDAM

Cambridge MA, USA

Jan 2019 - present

Supervisors: Dr. 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 as part of Pre-Doctoral Fellowship

CENTER FOR COMPUTATIONAL ASTROPHYSICS - SIMONS FOUNDATION

New York, USA

Sep. 2021 - Oct. 2021

Supervisor: Prof. W. M. Farr, Stony Brook University, USA

Subject: Understanding observed features in the black hole mass distribution

International research internship

OBSERVATÓRIO NACIONAL - RIO DE JANEIRO

Rio de Janeiro, Brazil

Mar. 2017 - Jun 2017

Supervisors: Supervisors: Prof. H Röttgering and Dr. R. A. Overzier,

Subject: Probing radio galaxies with MG II absorbers

MSc thesis research Project

LEIDEN UNIVERSITY

Leiden, The Netherlands

Feb. 2016 - Dec. 2016

Supervisors: Supervisors: 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

GRADUATE SCHOOL OF ARTS AND SCIENCES STUDENT COUNCIL CONFERENCE GRANT

2022

\$ 750,-, (Student travel grant)

CERTIFICATE OF DISTINCTION IN TEACHING, DEREK BOK CENTER, HARVARD UNIVERSITY

2021

Rewarded based on graduate student evaluations of teaching.

INTERNATIONAL TRAVEL GRANT, THE AMERICAN ASTRONOMICAL SOCIETY

2020

\$ 700,-, (Travel grant)

SPECIAL COMMENDATION DEREK BOK CENTER, HARVARD UNIVERSITY

2020

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

STICHTING STERRENKUNDIG STUDIEFONDS

2019

€200,- (Student travel grant), J.C.Kapteyn foundation

OXFORD HINZE PHD FELLOWSHIP (DECLINED)

2018

PhD scholarship (3.5 years, Oxford University)

JANNEKE FRUIN-HELB GRANT

2017

Nominated for most exceptional grant proposal

LEIDS UNIVERSITEITS FONDS

2017

€1000,- (Student travel grant)

Publication Record

First-authored papers

- **van Son, L. A. C.**; de Mink, S. E; Renzo, M.; Justham, S.; Zapartas, E.; Breivik, K. ; Callister, T. ; Farr, W. M. ; Conroy, C. Callister, T.; Justham, S.; *“No peaks without valleys: The stable mass transfer channel for gravitational-wave sources in light of the neutron star-black hole mass gap.”*, to be submitted to ApJ within a 2 week timescale,
- 10- **van Son, L. A. C.**; de Mink, S. E; Callister, T.; Justham, S.; Renzo, M.; Wagg, T.; Broekgaarden, F. S.; 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
- 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”* (Submitted to ApJ) MNRAS, (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”* (Submitted to ApJ) arXiv:2111.13704
- 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 $\geq 500\text{Myrs}$ ”* (2022) ApJL 926 L36
- 3- **COMPAS team** et al. (w/ 21 further co-authors including **van Son, L. A. C.**) *“Rapid stellar and binary population synthesis with COMPAS”* (2022) ApJS 258 34
- 2- Law-Smith, J., A., P.; Everson, R., W.; Ramirez-Ruiz, E.; de Mink, S., E.; **van Son, L. A. C.**; et al. (w/ 8 further co-authors) *“Successful Common Envelope Ejection and Binary Neutron Star Formation in 3D Hydrodynamics.”* (Submitted to ApJ) arXiv:2011.06630
- 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 and colloquia

Invited

- Apr. 2022* ASTROPHYSICS SEMINAR Tel Aviv University, Israel
- Mar. 2022* ITC LUNCHEON Inst. for Theory and Computation, Center for Astrophysics, Harvard University , USA. (recording of talk)
- Dec. 2021* BLACK HOLE INITIATIVE COLLOQUIUM Harvard University , USA. (recording of talk)
- Dec. 2021* PHYSICS COLLOQUIUM State University of New York College, Geneseo, USA
- Dec. 2021* GROUP DISCUSSION SeBa group, invited to discuss recent work (online)
- Apr. 2021* TUFTS UNIVERSITY ASTRONOMY SEMINAR Dep. of Physics and Astronomy, Tufts University, Boston, USA
- Oct. 2020* BROWN BAG LUNCH TALK Massachusetts Institute for Technology, Cambridge, MA, USA
- Aug. 2020* ASTRONOMY SEMINAR Dep. de Astronomia, Universidad de Concepción, Concepción, Chile

Dec. 2019 **LEAD DISCUSSION SESSION** titled “Black Holes in the Pair Instability mass gap”, Lorentz workshop, “The Origins of Black Hole Mergers and Gravitational Waves”, Leiden, NL

Contributed

Jun. 2022 **CONTRIBUTED TALK**, CCA pre-doc symposium, CCA, New York, USA

Jun. 2022 **CONTRIBUTED TALK**, Workshop on Black Hole Dynamics: From Gaseous Environments to Empty Space, NBIA, Denm.

May. 2022 **CONTRIBUTED TALK, (CANCELLED-COVID)** Intermediate-Mass Black Holes, from Stellar Evolution to Cosmology, Puerto Rico

Dec. 2021 **CONTRIBUTED TALK**, The Gravitational Wave Physics and Astronomy Workshop, Hannover, Ger.

Dec. 2021 **SCIENCE CALL**, The Cosmic Explorer Consortium (online)

Nov. 2021 **OUTREACH SEMINAR**, Beacon Hill seminar series, “Unveiling the Cosmos”, Boston, MA, USA

July 2021 **CONTRIBUTED TALK**, Max-Planck-Gesellschaft, Ringberg retreat, Kreuth, Germany

July 2021 **CONTRIBUTED TALK**, European Astr. Society, Session 9: The Birth, Life, and Death of Black Holes, Leiden University, NL

May 2021 **CONTRIBUTED TALK**, IAUS 361: Massive Stars Near & Far, Dublin, Ireland

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

Feb. 2021 **CONTRIBUTED TALK**, 43rd COSPAR Scientific Assembly, Sydney, Australia

Sep. 2020 **CONTRIBUTED TALK**, Annual meeting of the German Astronomical Society, Heidelberg, Ger.

Sep. 2017 **CONTRIBUTED. TALK**, The Young European Radio Astronomers Conference, Bologna, Italy

Further Conferences/workshops attended

August 2022 “PAX 2022” Conference, MIT, Cambridge, USA

May 2022 “IAUS 361: Massive Stars Near & Far”, Conference, Ballyconnell, Ireland

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

May 2021 “Gravitational-Wave Astrophysics for Early Career Scientists”, Lorentz Workshop, Leiden NL

Oct. 2020 “AGN Disks: Where the wild Things Are” CCA - Flatiron Institute workshop, New York, USA

Jan. 2020 “LISA astronomy sprint meeting”, CCA - Flatiron Institute workshop, New York, USA

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

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

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

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

May 2019 “Electron-Capture-Initiated Stellar Collapse” Lorentz workshop, Leiden, NL

Mar. 2019 “Multi-messenger physics and astrophysics with compact binaries,” PHAROS PhD Training School, Jena, GER

Outreach and Public service

Leadership Rolls in Outreach

CHAIR OF LOCAL ORGANISING COMMITTEE, COMSCI CON-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 COVID-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)
- Enhancing community feeling by establishing a departmental wide Friday-afternoon social that continues to this day. (Jan. 2019 - Jun. 2019)

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

Coding and other skills

Astrophysical Codes

- COMPAS: COMPACT OBJECT MERGERS: POPULATION ASTROPHYSICS AND STATISTICS ([HTTP://COMPAS.SCIENCE](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](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.

— **FORTTRAN:** *Proficiency:* Basic working proficiency. Used when making adaptations to MESA.

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
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