

# Lieke van Son

60 Garden Street, P-203, Cambridge, MA 02138, USA

☎ (+1) 617 495-7461 | ✉ lvanson@flatironinstitute.org | 🏠 liekevanson.github.io | 📱 /LiekeVanSon

## Research Positions

### Flatiron Research Fellow

CENTER FOR COMPUTATIONAL ASTROPHYSICS, FLATIRON INSTITUTE

[New York, USA](#)

Sept 2023 - present

### Cotsen Postdoctoral Fellow in the Society of Fellows

PRINCETON UNIVERSITY

[Princeton, USA](#)

Sept 2023 - present

### Lyman Spitzer, Jr. Postdoctoral Fellow

PRINCETON UNIVERSITY

[Princeton, USA](#)

Sept 2025 - Sept 2027

### Ph.D. candidate

CENTER FOR ASTROPHYSICS | HARVARD & SMITHSONIAN – UNIVERSITY OF AMSTERDAM

[Cambridge, USA – Amsterdam, NL](#)

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

Jan 2019 - May 2023

### Guest researcher and Pre-doctoral Fellow

CENTER FOR COMPUTATIONAL ASTROPHYSICS - SIMONS FOUNDATION

[New York, USA](#)

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

Sep. 2021 - Oct. 2021

### International research internship

OBSERVATÓRIO NACIONAL - RIO DE JANEIRO

[Rio de Janeiro, Brazil](#)

Advisors: Prof. H Röttgering and Dr. R. A. Overzier, Subject: Probing radio galaxies with MG II absorbers

Mar. 2017 - Jun 2017

## Education

### Ph.D. in Astrophysics (Joint degree)

CENTER FOR ASTROPHYSICS | HARVARD & SMITHSONIAN – UNIVERSITY OF AMSTERDAM

[Cambridge, USA – Amsterdam, NL](#)

Subject: The massive stellar progenitors of gravitational-wave sources

Jan. 2019 - Awarded May 2023

### MSc in Astronomy, specialisation: Cosmology

LEIDEN UNIVERSITY

[Leiden, the Netherlands](#)

Advisors: Prof. J. Schaye and C. Barber Msc., Leiden University

Feb. 2016 - Awarded Jun. 2018

Subject: Overmassive black holes in the C-Eagle Simulation

### BSc in Astronomy

LEIDEN UNIVERSITY

[Leiden, the Netherlands](#)

Sep.2012 - Awarded Jun. 2015

## Grants, Awards, and Honors

### NASA Hubble Fellowship program (offer declined)

2023-2026

3 year fellowship supporting promising postdoctoral scientists to pursue independent research which contributes to NASA Astrophysics ~ \$225K

### Barbara Bell Graduate Student Dissertation Fellowship

spring 2023

Towards enabling the Faculty of Arts and Sciences to continue to attract, enroll, and support the brightest and most talented graduate students. Paid for spring tuition of Harvard GSAS: ~ \$5K

### Flatiron Institute Pre-Doctoral fellowship

2021-2022

5 month fellowship including 3 months paid housing in NYC at the Center for Computational Astrophysics. ~ \$7K

### 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.

# Invited and Contributed Talks

---

A full list of talks can be found on my website.

## SELECTION OF INVITED (15 OUT OF 19)

- 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](#) Friday Seminar, Munich, Ger.
- Jul. 2023* [CONFERENCE '3,2,1: MASSIVE TRIPLES, BINARIES AND MERGERS'](#) [Review](#) on pop. synth. in the GW context, Leuven, Be.
- Jun. 2023* [LORENTZ WORKSHOP: 'THE RENAISSANCE OF STELLAR BLACK-HOLE DETECTIONS IN THE LOCAL GROUP'](#) [Review](#) on the mass distribution of merging binary black holes, Leiden, NL
- Apr. 2023* [APS APRIL MEETING 2023](#) [Invited review talk](#), Physical Review Session on Gravitational Waves
- Nov. 2022* [PERIMETER INSTITUTE](#) Strong Gravity Seminar, Canada
- Oct. 2022* [CALTECH](#) TAPIR seminar, USA
- Sep. 2022* [AMERICAN MUSEUM OF NATURAL HISTORY](#) Seminar at Department of Astrophysics, USA
- Apr. 2022* [TEL AVIV UNIVERSITY](#) Astrophysics Seminar, Israel
- 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
- Aug. 2020* [UNIVERSIDAD DE CONCEPCIÓN, CONCEPCIÓN](#) Astronomy Seminar, Dep. de Astronomía, Chile
- Dec. 2019* [LORENTZ WORKSHOP - LEIDEN UNIVERSITY](#) *Lead Discussion Session: "Black Holes in the Pair Instability mass gap"*, NL

## SELECTION OF CONTRIBUTED TALKS & WORKSHOPS (20 OUT OF 30+)

- Nov. 2023* [PRINCETON SOCIETY OF FELLOWS SEMINAR](#) Princeton, USA
- Jun. 2023* [CAMBRIDGE UNIVERSITY, DAMTP FRIDAY GR SEMINAR](#) Cambridge, UK
- Feb. 2023* [CALTECH, ASTRO SEMINAR](#) Pasadena, USA
- Feb. 2023* [CARNEGIE OBSERVATORIES, LUNCH TALK](#) Pasadena, USA
- Dec. 2022* [CONFERENCE: GRAVITATIONAL WAVE PHYSICS AND ASTRONOMY WORKSHOP](#) contrib. talk, Melbourne, Aus.
- Nov. 2022* [MIAPBP STELLAR MULTIPLICITY WORKSHOP](#) contrib. talk/discussion session, Garching, Ger.
- Oct. 2022* [BERKELEY EXPLOSIVE ASTRO TALK](#) University of California, Berkeley, USA
- Jun. 2022* [CENTER FOR COMPUTATIONAL ASTROPHYSICS, PRE-DOC SYMPOSIUM](#) CCA, New York, USA
- Jun. 2022* [WORKSHOP: 'BLACK HOLE DYNAMICS: FROM GASEOUS ENVIRONMENTS TO EMPTY SPACE'](#) Contrib. talk, NBIA, Denm.
- 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
- Dec. 2021* [CONFERENCE: GRAVITATIONAL WAVE PHYSICS AND ASTRONOMY WORKSHOP](#) Contrib. talk, Hannover, Germany
- Dec. 2021* [COSMIC EXPLORER CONSORTIUM - SCIENCE CALL](#) (online)
- Nov. 2021* [OUTREACH SEMINAR: BEACON HILL SEMINAR SERIES](#) "Unveiling the Cosmos", Boston, MA, USA
- Jul. 2021* [MAX-PLANCK-GESELLSCHAFT, RINGBERG RETREAT](#) Contributed talk, Kreuth, Germany
- Jul. 2021* [CONFERENCE: EUROPEAN ASTRONOMICAL SOCIETY](#) Contrib. talk, session 9, Leiden University, NL
- May 2021* [CONFERENCE: IAUS 361: MASSIVE STARS NEAR & FAR](#) Contrib. talk, Dublin, Ireland
- Mar. 2021* [CONSORTIUM MEETING: VLT-FLAMES MASSIVE STAR](#) Contributed talk, Heidelberg Institute for Theoretical Studies, Ger.
- Feb. 2021* [CONFERENCE: 43<sup>rd</sup> COSPAR SCIENTIFIC ASSEMBLY](#) Contrib. talk, Sydney, Australia
- Sep. 2020* [ANNUAL MEETING OF THE GERMAN ASTRONOMICAL SOCIETY](#) Contrib. talk, Heidelberg, Germany
- Sep. 2017* [CONFERENCE: THE YOUNG EUROPEAN RADIO ASTRONOMERS CONFERENCE](#) Contrib. talk, Bologna, Italy

## Teaching & Advising

---

### 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

---

### KATIE SHARPE (HARVARD ASTRONOMY)

Fall 2020 - present

Co-advised on undergraduate project with Prof. Selma de Mink, Despite the challenges posed by COVID, our extended remote collaboration led to success. I have seen her transition from a junior Bachelor to an independent PhD student at Berkely. Her bachelor project culminated in a paper subm. to ApJ. **Started PhD program at Berkely in fall 2023**

### SOUMENDRA ROY (SUNY STONYBROOK)

Sept 2023 - present

Soumendra is a third year graduate student Stony Brook, co-advising on project with Prof. W. Farr. Soumendra is exploring what constraint we can place on cosmology (i.e.,  $H_0$ ) through binary neutron star mergers in the era of third-generation detectors.

### SASHA LEVINA (JOHNS HOPKINS UNIVERSITY)

Sept 2023 - present

First year graduate student project, co-advising with dr. Floor Broekgaarden. and Prof. Emanuelle Berti. Sasha is investigating the effects of cosmic star formation on GW sources, building on the models in *van Son et al ApJ, 948, 105 (2023)*.

### OTHER MENTORING/ADVISING EXPERIENCE

I have helped several undergraduate and master students to prepare for their PhD applications, and have advised numerous highschoolers about what it means to pursue a career in STEM. I furthermore joined the peer-mentoring program at Harvard during my time as a PhD student.

## Scientific outreach (Selection)

---

I am dedicated to outreach, in part because I love to share my excitement about the Universe, but especially because I believe that efforts to increase the participation of minorities in STEM can be best achieved through well-advised science communication. I typically participate in several outreach events per year, below I list a selection of larger and longer-term projects I have been involved in.

### 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 workshop budget** and overseeing the workshop programming.

### MEMBER OF LEADERSHIP TEAM, COMSCI CON (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 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.

**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 COVID-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, The Netherlands

## Press releases and popular media about my work

---

**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** “Gravitational-Wave Search Resumes after Three Years and Lots of Headaches” - May 2023

**KIJK MAGAZINE** “Meest nabije zwarte gat ontdekt” - May 2020

## Professional Services (Selection)

---

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

**SCIENTIFIC ORGANISING COMMITTEE** **Gravitational Waves Physics and Astronomy Workshop 2024** (July 2023 - present) Session on astrophysical gravitational-wave sources

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

**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.

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

**COLLOQUIUM SELECTION COMMITTEE** For the Center for Astrophysics, Harvard & Smithsonian colloquium, (Sep. 2020 - May 2022)

**REPRESENTATIVE OF GRADUATE STUDENTS** for the Promotion of a Vibrant Graduate Student Community, (Jul. 2020 - May 2023)

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

**ESTABLISHED DEPARTMENTAL-WIDE WEEKLY SOCIAL GATHERING** (**‘the Friday Borrel’ in Amsterdam**), (Jan. 2019 - Jun. 2019)

## International collaborations

---

**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: core-member and co-developer** Compact Object Mergers: Population Astrophysics and Statistics. [Co-author to method paper](#), and 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. Currently leading development of ‘MESA Hackathon’ during IAU general assembly meeting 2024.

**Software development** — **PYTHON:** 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** Assistant Prof. Dr. Maya Fishbach  
**Institute** Canadian Institute for Theoretical Astro-  
physics, University of Toronto, Canada.  
**Connection** External collaborator  
**Contact** fishbach@cita.utoronto.ca

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

**Name** Prof. Dr. Will Farr  
**Institute** Stony Brook University and the Center for  
Computational Astrophysics, USA  
**Connection** Postdoctoral mentor and collaborator  
**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

- 16- 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 Candidate Progenitor HD 5980"*, Submitted to ApJ (2023),
- 15- 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),
- 14- 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),
- 12- **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) ,
- 13- **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),
- 11- **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)
- 10- **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)
- 9- **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

- 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  $\geq 500\text{Myrs}$ ",*  
 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.