Ylva Gotberg

Title

Stars stripped in binaries: from cosmic reionization to gravitational waves

Abstract

Most massive stars spend their lives in so close orbit with a companion star that severe mass exchange or even coalescence is inevitable as the stars evolve and swell. A third of massive stars are thus stripped of their fluffy, hydrogen-rich envelopes, leaving the compact helium core exposed. These stripped stars are so hot that most of their radiation is emitted in the ionizing regime. Using evolutionary and spectral models of stripped stars, I will show how they sometimes dominate the ionizing emission from full stellar populations and even significantly contribute to cosmic reionization. With their hard ionizing spectra, stripped stars possibly leave observable traces, for example in the nebular spectrum of distant galaxies.

Apart from being ionizing sources, stripped stars are also interesting to consider as gravitational wave emitters. Creating a population model, we predict that several stripped stars orbiting compact objects will be detectable by LISA.

Curriculum Vitae

Ylva Götberg
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Academic Background, Degrees and Education

No leave of absence.

2020–present	NASA Hubble postdoctoral fellow, Carnegie Observatories, Pasadena, USA.
2019–2020	Alvin E. Nashman postdoctoral fellow in Theoretical Astrophysics, Carnegie Observatories, Pasadena, USA.
2014–2019	PhD studies in Astrophysics, University of Amsterdam, The Netherlands. PhD degree obtained 7 of February 2019 with PhD thesis entitled "The properties and impact of stars stripped in binaries". *Supervisor:* Dr. S.E. de Mink.
2012–2014	MSc studies in Astrophysics, Lund Observatory, Sweden. MSc degree obtained 28 of April 2014 with MSc thesis entitled "What Gaia can reveal about the matter distribution in the Milky Way". *Supervisors:* prof. L. Lindegren and Dr. D. Hobbs.
2011–2012	MSc studies in Astronomy & Astrophysics, Institut de Planétologie et d'Astrophysique de Grenoble, Université Joseph Fourier, France. MSc thesis entitled "CH_3CN, its isotopologues and isomers in the solar-type protostar IRAS 16293-2422". *Supervisors:* prof. C. Ceccarelli and prof. C. Kahane.
2008–2014	Engineering Physics, Faculty of Engineering, Lund University, Sweden. Specialization in atomic and sub-atomic physics. MSc degree obtained 28 of April 2014.

Awards and Grants

- The Hubble Fellowship, NASA Hubble Fellowship Program, USA, January 2020.
- $16,500, Carnegie-Canada grant for collaborations with Canadian institutions, June 2019.
- The Alvin E. Nashman fellowship for Theoretical Astrophysics, Carnegie Observatories, Pasadena, USA, February 2018.
- Travel funds acquired during past five years: $2,700 + €4,900 + £500.
- 2nd prize for best presentation, IAU Symposium 329, November 2016.
- 1st prize in poster competition, conference in Groningen, The Netherlands, June 2015.
- 1st prize in poster competition, conference in Nunspeet, The Netherlands, May 2015.

Invited Scientific Presentations

Symposium University of California Santa Cruz (UCSC), USA, December 2020
Seminar Ringberg virtual seminar series, December 2020
Colloquium Perimeter Institute, Canada, September 2020
Colloquium Queen Mary University of London, UK, September 2020
Colloquium University of Delaware, USA, October 2020
Colloquium UFRGS Porto Alegre, Brazil, August 2020
Review Conference: *EAS: Probing cosmic dawn with current and future facilities and simulations*, Leiden, The Netherlands, July 2020.

Colloquium National Research Council of Canada's Herzberg Astronomy and Astrophysics Research, Canada, June 2020.
Symposium University of California Los Angeles (UCLA), Los Angeles, USA, February 2020.
Review Conference: *The art of measuring galaxy physical properties*, Milan, Italy, November 2019.
Symposium Stars and Planets Symposium, Harvard University, Cambridge, USA, September 2019.
Review Conference: *Merging Visions: Exploring Compact-Object Binaries with Gravity and Light*, KITP, Santa Barbara, USA, June 2019.
Colloquium Stockholm University, Sweden, December 2018.
Review Conference: *Hydrogen-deficient Stars*, Armagh, UK, September 2018.
Colloquium Radboud University, Nijmegen, The Netherlands, September 2018.
Review Conference: *Characterizing Galaxies with Spectroscopy with a view for JWST*, Lorentz center, Leiden, The Netherlands, October 2018.
Colloquium Lund Observatory, Sweden, September 2017.

Successful Proposals

Observing time:

2021	**PI: Götberg**, Magellan/MagE, 2 nights, 2021A, co-PI: Drout.
2020	**PI: Götberg**, Magellan/MagE, 5 nights, 2020B, co-PI: Drout.
2020	"Jumping Off the Upper-End: Constraining the mass-loss rates of the most massive stars in the universe with infrared spectroscopy", GS-2020B-Q-223, Gemini Observatory, 13.4h, PI: Chisholm
2020	**PI: Götberg**, Magellan/MagE, 2 nights, 2020A, co-PI: Drout.
2019	**PI: Götberg**, Magellan/MagE, 5 nights, 2019B, co-PI: Drout.
2019	"HOTFUSS – Hottest Faint Underluminous Stars Survey", XSHOOTER/VLT, 25.3h, PI: Geier
2019	"UV spectroscopy of He-star: the elusive stripped-envelope supernova progenitors", HST/COS, 10 orbits, Cycle 27, PI: Smith
2018	"The Missing Link in Massive Binary Star Evolution", HST/STIS, 39 orbits, Cycle 26, PI: Gies
2017	"Dwarfs and Giants: Massive Stars in Little Dwarf Galaxies", HST/STIS, 18 orbits, PI: Andrews
2015	"Uncovering the fate of the Tarantula's B-type binaries", 31h VLT/FLAMES, Period 96A, PI: Taylor

Computational time:

2017	**PI: Götberg**, 500,000 CPU hours, The Netherlands national supercomputer Cartesius.

Teaching Experience

Lecturer: MESA summer school 2021 (KITP, Santa Barbara).

TA: MESA summer school 2017 (KITP, Santa Barbara), Stellar atmospheres and radiative transfer 2016 (Master's course, University of Amsterdam), Stellar evolution and structure 2015, 2016 (Master's course, University of Amsterdam).

Primary supervisor: B. Hovis-Afflerbach (2020-ongoing), undergraduate summer student program, Carnegie Observatories, Pasadena, USA.

Co-supervision: PhD student E. Laplace (2017-ongoing), BSc M. Briel (2016), BSc T. Dodds

(2016), MSc W. van Rossem (2016-2017), University of Amsterdam.

Completed Courses

Presenting: Workshop in communicating with the public, Alan Alda center, 2019.

Management: "Mastering your PhD", University of Amsterdam, 2015.

Presenting: "Presentation skills", University of Amsterdam, 2015.

Teaching: Training for teaching assistants, University of Amsterdam, 2015.

Computer Skills

MacOs, Linux (unix), PBS, slurm, python, MATLAB, bash, fortran, LaTeX, Microsoft Office Package, some Adobe InDesign and Photoshop.

Outreach

Public talks at: Pint of Science (Amsterdam, 2018), Astronomy on Tap (Leiden, 2017), Astronomy on Tap (Santa Barbara, 2017), Public Symposium of IAU Symposium 329 (Auckland, 2016).