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Threading the needle: constraining the stellar content and dynamics of the Galactic Centre with hypervelocity stars

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PUBLICATIONS

First author

- *Searching for stars ejected from the Galactic Centre in DESI*
Sill Verberne, Sergey E. Koposov, Elena Maria Rossi, Zephyr Penoyre
Accepted in *Astronomy & Astrophysics*
- *Double progenitor origin of the S-star cluster*
Sill Verberne, Elena Maria Rossi, Sergey E. Koposov, Zephyr Penoyre, Manuel Cavieres, Konrad Kuijken
Published in *Astronomy & Astrophysics*
Volume 696, Article Number A218, April 2025
- *Improved constraints on Galactic Centre ejection of hypervelocity stars based on novel search method*
Sill Verberne, Elena Maria Rossi, Sergey E. Koposov, Tommaso Marchetti, Konrad Kuijken, Zephyr Penoyre, Fraser A. Evans, Dimitris Souropanis, Clár-Bríd Tohill
Published in *Monthly Notices of the Royal Astronomical Society*
Volume 533, Issue 3, September 2024, Pages 2747–2761
- *Radial velocities from Gaia BP/RP spectra*
Sill Verberne, Sergey E. Koposov, Elena Maria Rossi, Tommaso Marchetti, Konrad Kuijken, Zephyr Penoyre
Published in *Astronomy & Astrophysics*
Volume 684, Article Number A29, April 2024
- *The radial supernova remnant distribution in the Galaxy*
Sill Verberne, Jacco Vink
Published in *Monthly Notices of the Royal Astronomical Society*
Volume 504, Issue 1, June 2021, pages 1536–1544
- *First Ultraviolet Outburst Detected from ASASSN-18eh Strengthens Its Interpretation as a Cataclysmic Variable*
Sill Verberne, David Modiano, Rudy Wijnands
Published in *Research Notes of the AAS*
Volume 4, Issue 12, id.233, December 2020

Contributed

- *TUVO-21acq: A new cataclysmic variable discovered through a UV outburst*
David Modiano, Rudy Wijnands, David A.H. Buckley, Mariusz Gromadzki, **Sill Verberne**, Marieke van Etten
Published in *Astronomy & Astrophysics*
Volume 664, Article Number A165, August 2022
- *TUVOpipe: A pipeline to search for UV transients with Swift-UVOT*
David Modiano, Rudy Wijnands, Aastha Parikh, Jari van Opijnen, **Sill Verberne**, Marieke van Etten
Published in *Astronomy & Astrophysics*
Volume 663, Article Number A5, July 2022
- *Discovery prospects of dwarf spheroidal galaxies for indirect dark matter searches*
Shin'ichiro Ando, Bradley J. Kavanagh, Oscar Macias, Tiago Alves, Siebren Broersen, Stijn Delnoij, Thomas Goldman, Jim Groefsema, Jorinde Kleverlaan, Jaïr Lenssen, Toon Muskens, Liam X. Palma Visser, Ebo Peerbooms, Bram van der Linden, **Sill Verberne**
Published in *Journal of Cosmology and Astroparticle Physics*
Issue 10, article id. 040, October 2019

CURRICULUM VITAE

I was born on July 17th, 1998, in Amsterdam, Netherlands. Astronomy first peaked my interest in high school, which I attended at the Gerrit van der Veen College between 2010 and 2016. The school had a focus on art and culture, but I was more interested in the STEM subjects. I already enjoyed watching documentaries about space on TV, but about halfway through high school I got a new physics teacher that really ignited my interest in space and physics more generally. Gideon Koekoek was still an active researcher in gravitational waves, but had decided to also teach highschool physics during this period. I became more and more curiosity driven and decided to study physics and astronomy at the University of Amsterdam and the Vrije Universiteit Amsterdam.

During my bachelors degree I noticed that I found the astronomy courses consistently the most fun and interesting. I took every opportunity to register for the astronomy activities and courses on offer. For my bachelor thesis project I decided to work with dr. Jacco Vink on the distribution of the remnants of exploding stars, known as supernova remnants. The project was my first exposure to mostly independent research and a great learning experience for me. The results were interesting enough that I decided that I wanted to try to get it published during my masters, which resulted in my earliest first-author peer-reviewed publication in 2021. Already during my bachelors, but especially during my masters, I came to realise that especially observational astronomy appealed greatly to me. In parallel to publishing my bachelors research I started my 1 year master research project in the group of prof. dr. Rudy Wijnands. This research project was very observationally oriented and the goal was to contribute to a pipeline that could automatically detect ultraviolet transient events using public data from the Neil Gehrels Swift Observatory. I learned a lot about research, critical thinking, and academic writing during this time, not in small part due to the mentoring of dr. David Modiano.

At the start of the second year of my master, I decided that I wanted to continue in astronomy after the master and pursue a PhD. My most important criterion on choosing a PhD position was that it needed to be observational. I found the perfect fit with a PhD position in the group of prof. dr. Elena Maria Rossi at Leiden Observatory, co-supervised by prof. dr. Sergey E. Kposov at the University of Edinburgh and dr. Tommaso Marchetti at the European Southern Observatory. I started my PhD at the tail-end of COVID, which fortunately allowed me to come into the office regularly. The aim of my PhD has been to search for and characterise rare, extremely fast stars ejected by a dynamical interaction with a massive black hole using large surveys while also obtaining my own observations. I managed to write four more first author peer-reviewed publications during my PhD which can be read in this thesis.

Even though I will not continue my career in academic astronomy research, the experiences and skills I acquired during my studies and PhD will certainly form who I am and how I work moving forward.

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When I decided to pursue my PhD at Leiden Observatory I could not have hoped to meet so many amazing people. It's the people, not the science, who made the journey so enjoyable and unforgettable.

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Of course, a massive thanks also goes to everyone who was there for the coffee (or puzzle) breaks throughout these years! Every day, these moments were something to look forward to and I will cherish the memories I made during them. I'm sorry if I missed people: Alessia, Andrés, Ani, Beth, Celine, Christiaan, Darío, Dennis, Elena, Elia, Erik, Esther, Gijs, Jelle, Jinyi, Jurjen, Karin, Kevin, Louis, Lucie, Luna, Marta, Orestis, Osmar, Piyush, Pranjali, Rico, Rob, Roland, Sai, Sam, Sid, Silvia, Thomas, Timo, Vanesa, Victor, Will, Yuze, and Zeynab.

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