



Universiteit  
Leiden  
The Netherlands

## Exploring strange new worlds with high-dispersion spectroscopy

Serindag, D.B.

### Citation

Serindag, D. B. (2022, October 6). *Exploring strange new worlds with high-dispersion spectroscopy*. Retrieved from <https://hdl.handle.net/1887/3466049>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/3466049>

**Note:** To cite this publication please use the final published version (if applicable).

# List of publications

*A search for protoplanets around the young star HD 169142  
using molecule mapping*

**Serindag**, Griffiths, Snellen, and Landman

To be submitted

(Chapter 4)

*Measuring titanium isotope ratios in exoplanet atmospheres*

**Serindag**, Snellen, and Mollière

2021, *Astronomy & Astrophysics*, 655, A69

(Chapter 3)

*Is TiO emission present in the ultra-hot Jupiter WASP-33b?*

*A reassessment using the improved ExoMol TOTO line list*

**Serindag**, Nugroho, Mollière, de Mooij, Gibson, and Snellen

2021, *Astronomy & Astrophysics*, 645, A90

(Chapter 2)

*A Search for FeH in Hot-Jupiter Atmospheres with High-Dispersion Spectroscopy*

Kesseli, Snellen, Alonso-Floriano, Mollière, **Serindag**

2020, *The Astronomical Journal*, 160, 228

*Testing the Detectability of Extraterrestrial O<sub>2</sub> with the Extremely Large  
Telescopes Using Real Data with Real Noise*

**Serindag** and Snellen

2019, *The Astrophysical Journal Letters*, 871, L7

(Chapter 5)



# Curriculum vitae

I was born on January 30, 1993, in Alexandria, Virginia, to Yuksel Serindag and Martha Banks-Serindag. Soon thereafter, we left the suburbs of Washington, D.C., for New England and moved to Middletown, Connecticut, to live with my grandfather, David Banks. For the next two decades, this university city was to be my home, and in hindsight, a consequential influence on my path through higher education. My curiosity was present from a very young age and was well encouraged by my parents and grandfather, who made the effort to expose me to a wide variety of topics — from the arts to the sciences, music to politics. Indeed, throughout my youth and well into my high-school years, my career goals fluctuated wildly and included jobs as diverse as veterinarian, jurist, writer, musician, and diplomat. Amidst these varied interests, one passion that sprouted and grew without interruption was a fascination with space and the Universe, so much so that one of the primary requirements in my university search was that the school have an astronomy department. In the end, I did not move very far for my undergraduate studies. After graduating from Middletown High School in 2011, I matriculated to Wesleyan University, whose Van Vleck Observatory is a mere ten-minute walk from my family's home. Having declared my undergraduate majors in both astronomy and physics, in the third year of my bachelor's, I began conducting astronomy research under the supervision of Seth Redfield and for the next two years, I worked on characterizing exoplanets based on their phase curves. During this period, a fortuitous internet search for research experiences abroad led to a three-month stint at Leiden University during the summer of 2014, working in the group of Ignas Snellen. It is not an exaggeration to say that the summer I spent at the Sterrewacht set up the next stages of my academic career. After obtaining my Bachelor of Arts from Wesleyan in 2015, I hopped continents and returned to Leiden University in the Netherlands to pursue a master's degree in astronomy. After a year working on protoplanetary disks with Michiel Hogerheijde, I rejoined Ignas Snellen's re-

search group for my second master's research project, evaluating the feasibility of detecting oxygen in terrestrial exoplanets. Ultimately, the transition to the PhD entailed a much shorter move. After obtaining my Master of Science in 2017, I remained at the Sterrewacht in Leiden to pursue a PhD researching exoplanet atmospheres under the supervision of Ignas Snellen. Over four-and-a-half years, I explored a diverse set of research topics in the field. First finishing my master's research on detecting extraterrestrial oxygen, I subsequently turned my attention to exploring the chemical and isotopic compositions of gas-giant exoplanets, and attempting to detect the atmospheres of candidate protoplanets still undergoing formation. The results of these endeavors constitute this dissertation, which likely marks the conclusion of my career as an astronomer and scientist. After spending more than ten years in the university environment — over eight of which involved research in astronomy — I have decided to leave academia. Where I will find myself in the coming years and decades remains undetermined, but the one certainty I do have for the future is that my general curiosity and specific fascination with the Universe, and all the strange and wonderful marvels it contains, will endure.

# Acknowledgments

A PhD cannot be completed in isolation. It requires support from people outside the formal supervision structure. I hereby endeavor to express my gratitude as comprehensively as possible, while readily acknowledging that such an attempt will inevitably contain inadvertent oversights, for which I sincerely apologize.

Having a knowledgeable and friendly research group is not guaranteed, but in this regard I have been most fortunate. Thank you Alex Cridland, Alex Sánchez-López, Andrew Ridden-Harper, Aurélien, Aurora, Javi, Jens, Patrick, Paul, Rico, Sebastiaan, Tomas, and Yapeng for your research advice over the years. Many problems were quickly solved through your helpful interventions.

The support staff at the Sterrewacht and University also very much deserve my gratitude. In particular, thank you to the Sterrewacht IT department for being unfailingly patient with my technological struggles, and to the Sterrewacht Secretariat for your assistance in sorting out many logistical challenges.

Starting a new job is always a daunting prospect. Alberto, Andrej, Christos, Eleonora, Jit, Lorenzo, Maria Cristina, Tommaso, Valeria, and Vincenzo — you warmly welcomed me into your family from the beginning, making my transition to the PhD much smoother. From the bottom of my heart, grazie mille!

As any Sterrewachter knows, the borrel is the highlight of the work week, but is only as good as the company present. Alex Bohn, Alex Mechev, Alfred, Amy, Andrés, Andrew Allan, Arthur, Benoît, Christiaan, Christian, Ciaran, Dora, Drish, Elia, Elina, Erik, Evgenii, Folkert, Frits, Ivana, Jeroen, Joey, Josh Albert, Josh Butterworth, Lammim, Łukasz, Margot, Marina, Martijn, Matus, Merel, Michał, Michelle, Niccolò, Orestis, Osmar, Pranjal, Rob, Roi, Roland, Sierk, Steven, Thijs, Vanesa, and Zuzanna — you unfailingly livened Friday evenings, providing desperately needed and highly enjoyable recharges.

No life is complete without companions in adventure. Whether it was grabbing a coffee, attending a concert, enjoying nightlife, exploring a museum, participating in post-conference shenanigans, or simply hanging out, I could not

have asked for a better group than Andrea, Anna, Anniek, Bas, Dario, David, Dieuwertje, Dirk, Dominique, Lýdia, Mantas, Niloo, Patrick, Pooneh, Rafaël, Stella, Stijn, and Turgay.

Equally important are friends outside of work who keep you grounded and remind you that there is, in fact, a wonderful world beyond the Sterrewacht. Aaron, Bouke, Christine, Dara, Eimear, Gonzalo, Greg, Hannah, Isabel, Iva, Nicole, Radek, and Rob — in addition to all the fun we had, you helped me keep perspective and, more often than not, kept me afloat. For this, I cannot thank you enough. Additionally, thank you Eimear and Iva for your invaluable support in exiting academia.

Emanuele, you took me under your wing very early in my Leiden experience during LEAPS. Thank you for continuously challenging my preconceptions, and for always being generous in your advice for navigating the academic and non-academic landscape.

Marta, I am so glad that after two years of hoping, we *finally* managed to get to Amsterdam for Koningsnacht! Thank you for always being willing and eager to simply have fun. It may sound silly, but you reminded me how important it is to strive for a rich social life, and not allow a routine of complacent boredom develop and persist.

Kirsty, our mutual interests spanned quite a range in refinement, from performances at the opera and Concertgebouw to pumpkin bowling. Thank you for ensuring there was never a scarcity of gezelligheid, and for providing me much-needed reality checks.

Fraser, I can always count on you for a good gin and tonic, and getting my North American references. Thank you for being a calming influence and for always knowing what to say when my day required levity.

Jorge, I think we prove borrel friendships last forever! Thank you for always being down for bacchanal revelry, but more importantly, for teaching me how important it is to be myself.

Mikołaj, thank you for being a sounding board and fount of wisdom whenever I needed one. You are probably the most selfless person I know, and carried me through many difficult moments.

Gabriella, where to begin? You are my fellow wine aficionado, fashion police constable, and dispenser of justice. I can always depend on you for encouragement, advice, and general cheering up. Thank you for always having my back!

Omar — no words can quite do justice to the friendship we developed! From our long “philosophical discussions” (rants), to overindulging on food and drink on Gran Canaria, to simply being bad influences, we certainly created many

memories. Thank you for always pushing me to be better and to want more out of my life and career.

Lastly, but most importantly, I want to express how grateful I am to my family. Poppy, thank you for always reminding me how amazing the Universe is and the importance of unapplied research, especially when I was struggling with my own projects. Mom and Dad, you always supported me in my decision to leave the United States to continue in astronomy, even though that meant you would see me less often. And when I told you I would not continue in the field in which I spent a decade of my life studying and working, you never batted an eye. I honestly do not think I could ask for more loving, supportive parents. Kendar, thanks for always reminding me that life is too short and too precious not to take chances. Without all of you, I would never have made it to this point.

