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Lighting up dark exomoons: observational signatures of tidally induced volcanism in other worlds

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List of publications

Refereed publications

1. *Tidally heated exomoons around ϵ Eridani b: Observability and prospects for characterization*
E. Kleisioti, D. Dirkx, M. Rovira-Navarro, and M. A. Kenworthy
Astronomy and Astrophysics, 675, A57 (2023)
2. *The spectroastrometric detectability of nearby Solar System-like exomoons*
Q. B. van Woerkom and E. Kleisioti
Astronomy and Astrophysics, 684, A72 (2024)
3. *Direct detectability of tidally heated exomoons by photometric orbital modulation*
E. Kleisioti, D. Dirkx, X. Tan, and M. A. Kenworthy
Astronomy and Astrophysics, 687, A125 (2024)
4. *The MIRI Exoplanets Orbiting White dwarfs (MEOW) Survey: Mid-infrared Excess Reveals a Giant Planet Candidate around a Nearby White Dwarf*
M. A. Limbach, A. Vanderburg, A. Venner, S. Blouin, K.B. Stevenson, R.J. MacDonald, S. Jenkins, R. Bowens-Rubin, M. Soares-Furtado, C. Morley, M. Janson, J. Debes, S. Xu, E. Kleisioti, M. Kenworthy, P. Butler, J.D. Crane, D. Osip, S. Shectman, J. Teske
The Astrophysical Journal Letters, 973, L11 (2024)
5. *Modeling the interiors of Trappist-1f, g, h: Tidal Heating, Subsurface Oceans, and Cryovolcanic Activity*
E. Kleisioti, D. Dirkx, A. Louca, M. Rovira-Navarro, Apurva V. Oza, and M. A. Kenworthy
Submitted to Astronomy and Astrophysics

Non-refereed publications

1. *Could we observe exomoons around ϵ Eridani b?*
E. Kleisioti, D. Dirkx, M. Rovira-Navarro, and M. A. Kenworthy
AASTCS9, Exoplanets 4 (2022)
2. *The MIRI survey for Exoplanets Orbiting White-dwarfs (MEOW)*
M.A Limbach, A. Vanderburg, S. Blouin, M.R Janson, M. Kenworthy, E. Kleisioti, K. Stevenson, A. Venner, C. Morley
JWST Proposal. Cycle 2, ID. 4403 (2024)
3. *Exomoon detection via photometric signal variability due to surface hotspots*
E. Kleisioti, D. Dirkx, X. Tan, and M. A. Kenworthy
AASTCS10, Extreme Solar Systems V (2024)

4. *A socio-demographic study of the exoplanet direct imaging community*
L. Leboulleux, N. Desai, D. Echeverri, E. Kleisioti, L. König, M. Malin, E. Matthews,
S. Perera, S. Wolff, E. Choquet, E. Huby, G. Singh
Submitted to BAAS

Curriculum vitae

I was born in Athens in 1994. As a student, I was well-behaved, never causing trouble, although looking back, I sometimes wish I had been a little more rebellious. In school I felt a special pull towards the natural sciences. I was curious to understand nature in depth and the only books I enjoyed reading as an adolescent were works of science communication.

In Greece, we were raised by a generation that believed children should become engineers, lawyers, or doctors in order to secure a good income. A technical university, known for its competitive entry, was considered the natural choice for many students. Influenced by this culture, I chose to follow that path. Wanting to stay as close as possible to the natural sciences, I decided to study Chemical Engineering at the National Technical University of Athens, after carefully examining the courses offered, as it included courses like thermodynamics, physical chemistry, heat and mass transfer, and chemistry. After the first three years, however, the focus of the program shifted towards industrial applications, and I found myself losing interest. I realized that what I enjoyed most was learning new subjects on natural sciences.

I also longed to live abroad and explore different cultures. This led me to pursue an MSc in Space Science and Engineering in the UK. For my MSc thesis I worked on studying exoplanet atmospheres with TESS observations under the supervision of Dr. Vincent Van Eylen, a project which fueled my excitement about exoplanet systems and inspired me to pursue them further in my research. The end of the MSc coincided with the COVID-19 pandemic, and I had to return to Greece. As the UK began to reopen, I was happy to start an internship with the Rosetta mission at the Open University, studying the cometary environment. This experience confirmed my desire to continue in astrophysical research. Not long after, I was excited to be accepted by Dr. Matthew Kenworthy and Dr. Dominic Dirkx to pursue a PhD on exomoons, in a joint project between Delft University of Technology and Leiden Observatory. That is how I moved to the Netherlands.

Moving to a new country and culture during a lockdown came with challenges. A girl raised in a city full of noise can find it strangely difficult to sleep in the relative quiet streets of Leiden. Yet the guidance of my supervisors, together with the welcoming spirit of my new roommates (also PhD students at the Observatory), the 11th-floor group, and the first-year PhDs, smoothed my settling in. By the time spring arrived, the Netherlands transformed with the change of season. With the easing of restrictions, the Observatory started gradually coming back to life. The research, the multicultural environment, the daily exposure to science and the discussions with scientists at TU Delft and Sterrewacht are experiences I will never forget - and ones I already deeply miss now that I have returned to Greece.

During my PhD I worked on tidal heating in exomoons and exoplanets, and the observability of exomoons with different detection methods. I had the opportunity to present my work to multiple audiences, attended and organized conferences, wrote observing proposals, followed talks from scientists from all over the world, supervised two MSc students, and introduced two high school students to the world of astronomy.

As I write this chapter, I realize that the overall experience has left me a completely

different person. At present, I am exploring the world of industry, yet I find myself missing scientific research.

Acknowledgments

The completion of this PhD would not have been possible without the guidance, support, and encouragement of many people, to whom I am deeply grateful.

First and foremost, I would like to thank my supervisors, Matt and Dominic, for their invaluable guidance and encouragement throughout this journey. Matt, you taught me that even my wildest ideas could be turned into meaningful research. Dominic, your support and ability to frame my thoughts into clear, well-defined steps have been essential. Even in the most challenging moments you both provided understanding and support. Your advice has shaped not only my research but also my growth as a scientist, and I am deeply grateful for the opportunity to have worked under your supervision.

To all the wonderful people I met along the way—thank you for bringing balance and laughter, during the many intense moments of this PhD, as well as stimulating discussions and fun moments at conferences. A special word of thanks goes to our group at 11-th floor group, which still feels very gezellig. Thank you Willy, David, Thijs, Rico, Floor, Kira and everyone there for creating such a warm atmosphere. Specifically, Rico thank you for teaching me "Links Rechts". David your tremendous support and love for our group has moved me. Willy thank you for your warmth and care. I would also like to thank the 1st year (or not) PhDs, including Amy, Christiaan, Christian, Roi, and Elena. Tara we have lived such nice moments together - thank you! Louise and Andrea, I miss our little chats. Moving on to later years, the Groovy Group has been awesome. Michiel, thank you for teaching me "griechischer Wein", and for bringing such a positive atmosphere in the institute. Richelle I think I won the game of forgetting our cards. Pengyu, it was always so nice chatting with you at the office.

I would also like to thank my collaborators in Delft. Marc thank you for your amazing insights and advice. Rania, Sam you were always adding a friendly note when I was coming there. I am grateful to the PEPSci network, which provided me with such inspiring discussions. Thank you Christiaan, Orr, Mark, Vivian, Alexandra, and of course Tara and Willy.

In addition, I would like to acknowledge the Master students, Stef and Quirijn, whose curiosity and dedication continually inspired me, as well as Tin and Ella. Thank you for choosing to do your projects with me. Working with all of you has been a source of motivation and joy.

Outside of academia, I want to thank my roommates Kirsty and Reinier. Kortenaerstraat is in my heart.

Finally, I want to thank my friends and family, who I love and who have been there for me: — the ones sharing the Dutch journey - Chryssako mou and Milino - the ones back in Greece (or abroad) - Nephelako, who is probably an expert in astro after reading all my stuff, Zooulako mou, Vickara I, Vickara II, Dimitrako, Giannako I, Giannako II, Orphiko, Marako, xaderfakia, Yiakouli, Litouli, Iriako, Vatzoula, Leli, and Stelli.

Μαμά, Παπά ευχαριστώ που με στηρίζατε.
(Mum, Dad thank you for supporting me.)

Victorako mou, you were always by my side, merci para poli.

