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Dusty perspectives on the cradles of planets

Guerra Alvarado, O. M.

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List of Publications

Refereed publications

IRAS4A1: Multiwavelength continuum analysis of a very flared Class 0 disk

Osmar M. Guerra-Alvarado, N. van der Marel, J. Di Francesco, L. W. Looney, J. J. Tobin, E. G. Cox, P. D. Sheehan, D. J. Wilner, E. Macías, and C. Carrasco-González, 2024, *Astronomy & Astrophysics*, 681, A82.

Into the thick of it: ALMA 0.45 mm observations of HL Tau at a resolution of 2 au

Osmar M. Guerra-Alvarado, Carlos Carrasco-González, Enrique Macías, Nienke van der Marel, Adrien Houge, Luke T. Maud, Paola Pinilla, Marion Villenave, Yoshiharu Asaki, and Elizabeth Humphreys, 2024, *Astronomy & Astrophysics*, 686, A298.

A high-resolution survey of protoplanetary disks in Lupus and the nature of compact disks

Osmar M. Guerra-Alvarado, Nienke van der Marel, Jonathan P. Williams, Paola Pinilla, Gijs D. Mulders, Michiel Lambrechts, and Mariana Sanchez, 2025, *Astronomy & Astrophysics*, 696, A232.

Rocky planet formation in compact disks around M dwarfs

M. Sanchez, N. van der Marel, M. Lambrechts, G. D. Mulders, and **O. M. Guerra-Alvarado**, 2025, *Astronomy & Astrophysics*, 689, A236.

Grain-size measurements in protoplanetary disks indicate fragile pebbles and low turbulence

Haochang Jiang, Enrique Macías, **Osmar M. Guerra-Alvarado**, and Carlos Carrasco-González, 2024, *Astronomy & Astrophysics*, 682, A32.

Multiple Shells Driven by Disk Winds: ALMA Observations in the HH 30 Outflow

J. A. López-Vázquez, Chin-Fei Lee, M. Fernández-López, Fabien Louvet, **O. Guerra-Alvarado**, and Luis A. Zapata, 2024, *The Astrophysical Journal*, 962, 28.

Submitted publications

From large-scale outflows to compact line emission in IRAS4A2

Osmar M. Guerra-Alvarado, N. van der Marel, P. Nazari, J. Di Francesco, Ł. Tychoniec, L. W. Looney, E. G. Cox, D. J. Wilner, and M. R. Hogerheijde, Submitted to *Astronomy & Astrophysics*.

Gaps and Rings: A Near-Universal Trait of Extended Protoplanetary Discs

Q. Bosschaart, **O. M. Guerra-Alvarado**, N. van der Marel, and G. D. Mulders, Submitted to *Astronomy & Astrophysics*.

Multi-Wavelength Dust Characterization of the HL Tau Disk and Implications for Planet Formation

Takahiro Ueda, Sean M. Andrews, Carlos Carrasco-González, **Osmar M. Guerra-Alvarado**, Satoshi Okuzumi, Ryo Tazaki, and Akimasa Kataoka, Accepted for publication in the *Astrophysical Journal*.

Curriculum Vitae

I was born in Colorado Springs, United States, on July 13th, 1994. As my father used to tell me, it was a very luxurious birth, since he was helping build a house for a well-known doctor. I have no real recollection, however, of those early days.

As far as I'm concerned, I grew up in a town called Morelia, west of Mexico City, where I spent most of my early school years. Back then, I didn't have a clear idea of what I wanted to become; I was, after all, still a child, but I always considered myself good at studying and eager to solve mysteries. In middle school, a few things changed. I started focusing more on my friends, and I realized I wasn't particularly good at pure mathematics, which, looking back, really comes as a surprise. I was, however, drawn to problem-solving courses and history, though the latter path never materialized.

In high school at Liceo Michoacano, I was expected to begin thinking about my future career. I probably should have paid more attention to that decision, but I was too busy focusing on other things. I don't regret at all how I spent those years.

From 2012 to 2017, I studied Electronic Engineering at Instituto Tecnológico de Morelia. I completed a major in biomedical instrumentation, but I realized midway that I wanted to pursue something else. Regardless, I graduated by starting a project on non-invasive glucose monitoring using NIR spectroscopy under the supervision of Dr. Adriana del Carmen Téllez Anguiano, together with my friend and colleague, Ing. Kevin Raúl

Hernández Franco.

After graduation, I decided not to pursue a career in engineering anymore and instead applied for a master's in a field I found more fulfilling. I was fortunate to be accepted into the Master's program in Astrophysics at UNAM, under the supervision of Dr. Carlos Carrasco González. I've always been fascinated by planets and the search for life beyond Earth, so it felt like a natural fit. From 2018 to 2021, I caught up with relevant courses needed as an astrophysicist, worked on and wrote my thesis, and graduated with honors.

Still not ready to leave research behind, I applied for PhD positions in several countries. It was a long and challenging process, but eventually, I landed a position at Leiden University. My friend Kevin, who also helped me graduate and who was living in the Netherlands at the time, encouraged me to apply to Leiden. However, I wasn't sure if anyone there was working on what I did for my master's. Nevertheless, I applied, and to my surprise, Dr. Nienke van der Marel offered me a PhD position in her planet formation group starting on September 13th, 2021.

Though it was difficult to leave my life in Mexico, my PhD has taken me to incredible places, Japan, Belgium, France, and even back to Morelia to present my work. These four years have challenged me and helped me grow in ways I never expected, and I now realize how valuable that growth has been. After completing my PhD, I look forward to a new challenge outside academia, where I can continue to grow and apply everything I've learned, especially during these past four years.

Acknowledgments

This PhD marks a wonderful chapter in my life, full of change, challenge, and growth. I could never have done it alone, so there are many people I want to thank.

First of all, I want to thank my family. To my parents, Elizabeth and Manuel, thank you for always supporting me and letting me choose my own path, no matter where it led. I know you always care and worry about me, and I'm deeply grateful for that. To my sister Thalia, thank you for always being there for me. You're the best sister I could have asked for.

To my supervisors, Nienke and Michiel, thank you for your patience, guidance, and all your support throughout the PhD. Thank you for allowing me to grow, both professionally and personally. I've learned so much from working with you. I also want to thank my former supervisors, Carlos and Enrique. Without you, I probably would never have studied protoplanetary disks or discovered how fascinating these systems are.

To my fellow PhD and dear friend Alessia, thank you for all the talks that kept me sane, and for all the meetings and office hours that were much more fun with you. To all the protoplanetary disk folks and the Allegro team, thank you for your help with my data and your endless patience with my questions about planet formation: Marianna, Margot, Lucas, Milou, Andres, Andrew, Luna, Marissa, Logan, and Sam.

I'd also like to thank many people from the institute: the secretariat staff for their continuous help and support, and the IT team for always solving my technical problems. Special thanks to the social events com-

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To the people in Leiden who made these years so memorable, I'm thankful to share so many happy moments with you. Kevin, amigo, there's probably not much I can put into words, but without you, I probably wouldn't even be in the Netherlands. Thank you for everything. To my first friend and colleague here, Jurgen, thank you for helping me adjust to life in the Netherlands. Alfred, days at the office were never the same without you, amigo, no more gossip, no more fun breaks. To my friends Mira, Andrés, and Javier, thank you for all the unforgettable weekends, the wild raves and parties, but most importantly, for always being there. To my bromigo, Andrew, thank you for all the gym and darts sessions. To Nina, thank you for standing by me during the toughest year of my PhD, I love you.

To my family back in Mexico, thank you for your unconditional love and support. And to my friends in Morelia, thank you for helping shape the person I am today: Manuel, Diego, Pepe, Alex, Haydee, Karen, Beto, Lalo, Rasu, Paola, Anahí, Karla, Andu, Aura, y por supuesto, Carlos (Kike), donde quiera que estés, nos vemos pronto.