Sierra L. Grant, Ph.D.

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Current Employment

Max Planck Institute for Extraterrestrial Physics **09/2021–Present**
Postdoctoral Researcher
Supervisor: Prof. Ewine F. van Dishoeck

Education

Boston University **05/2017–08/2021**
Ph.D.
Advisor: Prof. Catherine C. Espaillat
"Protoplanetary Disk Evolution: From Inner Disk Accretion to Outer Disk Dust Evolution"

Boston University **09/2015–05/2017**
M.A.
Advisor: Prof. Catherine C. Espaillat

University of Michigan **09/2011–05/2015**
B.S. Astronomy & Astrophysics and B.S. Interdisciplinary Physics
Advisor: Prof. Nuria P. Calvet

Research Interests

I study protoplanetary disks: the disks of gas and dust around young stars that are the birthplaces of exoplanets. Specifically, I focus on the inner disk chemistry and structure and how populations of disks evolve. I use models and observations, with data from space-based (including JWST, *Spitzer*, and *Herschel*) and ground-based telescopes (including the VLT, Lowell Discovery Telescope, Gemini South, NASA's IRTF, ALMA, and NOEMA), to characterize these disks and their evolution.

Honors and Awards

2020	ALMA Student Observing Support ($33,148)
Fall 2015	Dean's Fellowship
Fall 2011, 2013, & Spring 2014	University Honors

Presentations

01/2023	MPE Center for Astrochemical Studies Seminar – **Invited Talk**
10/2022	Observing the Universe in Motion: 5 Years of GRAVITY – **Invited Talk**
09/2022	The Inner Regions of Protoplanetary Disks – **Invited Talk**
05/2022	Center for Astrophysics SMA Seminar – **Invited Talk**
04&05/2022	MPE IR Group Tea Talk – **Contributed Talk**
05/2022	ESO Star and Planet Formation Seminar – **Invited Talk**

Presentations (cont.)

02/2022	IR2022: An Infrared Bright Future for Ground-based IR Observatories in the Era of JWST – **Contributed Talk**
03/2021	Caltech Tea Talk – **Invited Talk**
12/2020	Five years after HL Tau: a new era in planet formation – **Contributed Talk**
12/2018	Star and Planet Formation Lunch Talk, Amherst, MA – **Invited Talk**
07/2018	Cool Stars 20, Boston, MA – **Poster**
01/2018	The 4th MA-CT Regional Star Formation Meeting, Boston, MA – **Contributed Talk**
12/2017	Boston Area Exoplanet Science Meeting, Cambridge, MA – **Contributed Talk**
01/2017	Regional Star Formation Meeting, New Haven, CT – **Contributed Talk**
06/2015	Frontiers in Star Formation: Celebrating Contributions to the Field by Nuria Calvet and Lee Hartmann, Ann Arbor, MI – **Invited Talk**
01/2015	225th American Astronomical Society Meeting, Seattle, WA – **Poster**
02/2014	Scientista Symposium, Massachusetts Institute of Technology, Cambridge, MA – **Poster**
2013, 2014, & 2015	Undergraduate Research Presentation, University of Michigan, Ann Arbor, MI – **Poster**

Publications

First-Author, Refereed:

03/2023	*"MINDS. The detection of $^{13}CO_2$ with JWST-MIRI indicates abundant CO_2 in a protoplanetary disk"* **Sierra L. Grant**, Ewine F. van Dishoeck, Benoît Tabone, Danny Gasman, Thomas Henning, Inga Kamp, and 40 others. ApJ, 947L, 6G
01/2022	*"Accretion Properties in Herbig Ae/Be Stars as Traced by the Brγ Line"* **Sierra L. Grant**, Catherine C. Espaillat, Sean Brittain, Caleb Scott-Joseph, Nuria Calvet ApJ, 926, 229G
06/2021	*"An ALMA Survey of Protoplanetary Disks in Lynds 1641"* **Sierra L. Grant**, Catherine C. Espaillat, John Wendeborn, John J. Tobin, Enrique Macías, Anneliese Rilinger, Álvaro Ribas, S. Thomas Megeath, William J. Fischer, Nuria Calvet, Kyoung Hee Kim ApJ, 913, 123
08/2018	*"Herschel Observations of Protoplanetary Disks in Lynds 1641"* **Sierra L. Grant**, Catherine C. Espaillat, S. Thomas Megeath, Nuria Calvet, William J. Fischer, Christopher J. Miller, Kyoung Hee Kim, Amelia M. Stutz, Álvaro Ribas, Connor E. Robinson ApJ, 863, 13

Co-Author, Refereed:

05/2023 *"A rich hydrocarbon chemistry and high C to O ratio in the inner disk around a very low-mass star"*
Benoît Tabone and 45 coauthors, including **S. Grant** [5th], published in Nature Astronomy

10/2022 *"The GRAVITY Young Stellar Object survey – IX. Spatially resolved kinematics of hot hydrogen gas in the star/disk interaction region of T Tauri stars"*
J. A. Wojtczak and 59 coauthors, including **S. Grant** [33nd]

09/2022 *"The kinematics and excitation of infrared water vapor emission from planet-forming disks: results from spectrally-resolved surveys and guidelines for JWST spectra"*
Andrea Banzatti and 21 coauthors, including **S. Grant** [12th]

02/2022 *"Scanning disk rings and winds in CO at 0.01-10 au: a high-resolution M-band spectroscopy survey with IRTF-iSHELL"*
Andrea Banzatti and 13 coauthors, including **S. Grant** [10th]

05/2019 *"Using Multiwavelength Variability to Explore the Connection among X-Ray Emission, the Far-ultraviolet H_2 Bump, and Accretion in T Tauri Stars"*
C. C. Espaillat and 3 coauthors, including **S. Grant** [3rd]

Accepted Observing Proposals

As PI:

2023 JWST-MIRI (41.5 hours in Cycle 2)
"Probing carbon chemistry and dust in the planet-forming zones of brown dwarf disks"
Sierra Grant, Ewine van Dishoeck, Milou Temmink, Aditya Arabhavi, Benoît Tabone, and 13 others

2023 VLT–CRIRES+ (17.1 hours in P111)
"Can you tell what JWST-MIRI is observing? Distinguishing disk and wind emission in all Cycle 1 disks"
Sierra Grant, Andrea Banzatti, K.M. Pontoppidan, Giulio Bettoni, E. F. van Dishoeck, Carlo Felice Manara, and 7 others

2022 NOEMA (18 hours, ranked "A", Co-PI)
"Orion's hunting grounds: The first unbiased mass census of Herbig Ae/Be disks"
Sierra Grant, Lucas Stapper, Alice Booth, Michiel R. Hogerheijde, Ewine F. van Dishoeck, Sierk van Terwisga

2021 VLT–CRIRES+ (1.4 hours, Science Verification, not observed)
"Probing the impact of dust cavities on the gas distribution in intermediate-mass stars"
Sierra Grant, Carlo Manara, Ewine van Dischoeck, Giulio Bettoni, Melissa McClure

2020 Gemini South Observatory (17 hours in 2020A, 7.7 hours in 2020B)
"Accretion onto Intermediate-mass Stars"
Sierra Grant, Catherine Espaillat, Sean Brittain, Nuria Calvet

As PI (cont.):

2019	ALMA (Cycle 7, 2019.1.00951.S) "Characterizing Protoplanetary Disks in the Orion L1641 Region" **Sierra Grant**, Catherine Espaillat, Kyoung Hee Kim, Enrique Macías, Álvaro Ribas, Tom Megeath, Nuria Calvet, John Tobin
2019 & 2020	NASA Infrared Telescope Facility (3 half-nights each in 2019B and 2020A) "Accretion onto Intermediate-mass Stars" **Sierra Grant**, Catherine Espaillat, Sean Brittain, Nuria Calvet
2017 & 2018	Lowell Discovery Telescope, Lowell Observatory (10 half-nights) "Probing Gas and Dust in the Sites of Planet Formation" **Sierra Grant**, Catherine Espaillat

As Co-I:

- JWST-NIRSpec (5.6 hours in Cycle 2)
- VLT-CRIRES+ (41 hours in P110, 25 hours in P111)
- ALMA
- *Hubble Space Telescope* (6 orbits) & *Chandra X-ray Observatory* (35ks) & VLA (9.6 hours)
- *Spitzer Space Telescope* (Proposal ID #12036)

Affiliations and Outreach

11/2021 – Present	Planet Formation Witnesses and Probes: Transition Disks Research Unit
09/2021 – Present	Inclusion, Diversity, and Equity in European Astronomy (IDEEA)
09/2015 – 08/2021	Women as Leaders in Astronomy (Boston University)
09/2015 – 08/2021	Boston University Astronomy Public Open Nights
09/2018 – 05/2019	Letters to a Pre-Scientist Pen Pal
09/2011 – 05/2015	Student Astronomical Society
09/2011 – 05/2012	Douglass Houghton Scholars Program
09/2011 – 05/2012	Women in Science and Engineering Residency Program
06/2010	Michigan Technological University Women in Engineering Program

Leadership

09/2018 – 08/2021	Women as Leaders in Astronomy Organizer
09/2018 – 08/2019	Graduate Student Representative

Mentored Students

10/2021 – 12/2022	**Giulio Bettoni**: Giulio was a Leiden University Ph.D. student who was working with me at MPE in Garching. Giulio's focus was on chemistry in the inner regions of protoplanetary disks.
06/2018 – 08/2019	**Caleb Scott-Joseph**: Caleb was a high school student at Boston University Academy who I mentored to analyze high-resolution, near-infrared spectra of protoplanetary disks.

Workshops

12/2017	JWST Proposal Planning Workshop, Pasadena, CA
03/2016	NRAO Live! ALMA Proposal Workshop at Boston University, Boston, MA

Teaching

Spring 2016	AS 203: Principles of Astronomy II Teaching Assistant