Ke Zhang

Assistant Professor, University of Wisconsin-Madison
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Research Interests

Planet formation, Protoplanetary disks, Astrochemistry

Education

California Institute of Technology — Pasadena, CA USA
Ph.D. in Astrophysics. Advisor: Geoffrey A. Blake — 10/2009 – 06/2015
Thesis: Volatiles in Protoplanetary Disks

Beijing Normal University — Beijing, CHINA
M.S. in Astrophysics — 09/2005 – 07/2008
B.S. in Astronomy — 09/2001 – 07/2005

Professional Employment

Assistant Professor — Madison, WI USA
Department of Astronomy, University of Wisconsin-Madison — 08/2020 – Present

NASA Hubble Fellow — Ann Arbor, MI USA
Department of Astronomy, University of Michigan — 08/2017 – 07/2020

Postdoctoral Researcher — Ann Arbor, MI USA
Department of Astronomy, University of Michigan — 07/2015 – 07/2017

Awards and Honors

- Scialog Fellow: Signatures of Life in the Universe — 03/2020
- NASA Hubble Fellowship — 01/2017
- NASA Sagan Fellowship (declined) — 01/2017
- The ALMA Ambassadors Postdoctoral Program — 01/2017
- The Chinese government award for outstanding self finance students Abroad (6k) — 03/2015
- Academic fellowship, Beijing Normal University — 09/2006
- Excellent Students Awards, Beijing Municipality Government — 06/2005
- Chongying scholarship, Beijing Normal University — 2002-2004

External research support

Current Supports

- NSF Graduate Research Fellowship, graduate student Tayt Armitage, $147k, 2026-2029
- Dynamic Evolution of Water Reservoirs in Planet-Forming Disks (PI. Zhang), 60k, Fall competition of UW-Madison, 2025/07-2026/06
- Building on ALMA: a JWST legacy survey of the chemical evolution of planet-forming disks (PI. Zhang) $808k in total ($412k for UW-Madison), Space Telescope Science Institute, 2024/01-2026/12
- Searching for Signs of Life in Exoplanet Hycean Worlds (PI: Widicus Weaver, co-I. Zhang) $479k in total, 50K for Zhang, Wisconsin Alumni Research Foundation (WARF) – 2024/09-2026/08

- Collaborative research: The Evolution of Gas in Protoplanetary Disks (PI. Zhang)
  $444k, NSF Astronomy and Astrophysics Research Grants, 2022/09-2025/08
- NSF Graduate Research Fellowship, graduate student Estephani Torresvillanueva, $147k, 2023-2026
- A DSHARP-MIRI Treasury survey of Chemistry in Planet-forming Regions (PI. Salyk, co-I. Zhang),
  $36k for UW-Madison, Space Telescope Science Institute, 2023/04-2026/03

Past

- NRAO Student Observing Support Award (PI. Zhang),
  $31k to support UW-Madison graduate student Estephani Torresvillanueva, 2022/01-2023/10
- NASA Hubble Fellowship (PI. Zhang)
  $330K, 2017/08-2020/07
- The ALMA Ambassador
  $10k, 2017/01-2018/01

Publications

- Total career citations recorded in the NASA's Astrophysics Data System: 4348
  link to publication list on NASA/ADS
- H-index: 35
- Top five first-author publications:
  Zhang et al. 2015 (347 citations), Zhang et al. 2021 (147), Zhang et al. 2017 (131), Zhang et al. 2016 (105), Zhang et al. 2019 (96)

Papers and papers led by students/postdocs advised

$\star$: postdoc advised, *o*: student advised

23. **Zhang, K.**, Pérez, L. M., Pascucci, I., Pinilla, P., Cieza, L. A., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). I. Program Overview and Summary of First Results, ApJ, 989, 1.
22. *Trapman, L., **Zhang, K.**, Rosotti, G. P., Pinilla, P., Tabone, B., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). V. Protoplanetary Gas Disk Masses, ApJ, 989, 5.
21. *Trapman, L., Vioque, M., Kurtovic, N. T., **Zhang, K.**, Rosotti, G. P., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). XI. Beam-corrected Gas Disk Sizes from Fitting ^{12}CO Moment Zero Maps, ApJ, 989, 10.
20. ^{o}Armitage, T., Williams, J., **Zhang, K.**, Krijt, S., Tracing Pebble Drift History in Two Protoplanetary Disks with CO Enhancement, ApJ, 2025, in revision
19. ^{o}Hutnik, L., Trapman, L., **Zhang, K.**, van't Hoff, M., Hacar, A., Hogerheijde, M., Bergin, E., Not just an iceline tracer: Detection of N_2H^+ Surface Layer in the Protoplanetary disk around TW Hydrae, 2024, ApJ, in revision
18. *Trapman, L., Tabone, B., Rosotti, G., & **Zhang, K.** (2023), How large is a disk - what do protoplanetary disk gas sizes really mean?, ApJ, 954, 41.
17. Zhang, S., ^{o}Kalscheur, M., Long, F., **Zhang, K.**, Long, D. E., Bergin, E. A., Zhu, Z., & Trapman, L. (2023), Substructures in Compact Disks of the Taurus Star-forming Region, ApJ, 952, 108.

16. *Trapman, L., **Zhang, K.**, van't Hoff, M. L. R., Hogerheijde, M. R., & Bergin, E. A. (2022), A Novel Way of Measuring the Gas Disk Mass of Protoplanetary Disks Using $N_2H^+$and $C^{18}O$, ApJL , 926, L2.

15. *Trapman, L., Tabone, B., Rosotti, G., & **Zhang, K.** (2022), Effect of MHD Wind-driven Disk Evolution on the Observed Sizes of Protoplanetary Disks, ApJ, 926, 61.

14. **Zhang, K.**, Booth, A. S., Law, C. J., Bosman, A. D., Schwarz, K. R., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). V. CO Gas Distributions, ApJS, 257, 5.

13. °Long, D. E., **Zhang, K.**, Teague, R., & Bergin, E. A. (2020), Hints of a Population of Solar System Analog Planets from ALMA, ApJL , 895, L46.

12. **Zhang, K.**, Schwarz, K. R., & Bergin, E. A. (2020), Rapid Evolution of Volatile CO from the Protostellar Disk Stage to the Protoplanetary Disk Stage, ApJL , 891, L17.

11. **Zhang, K.**, Bosman, A. D., & Bergin, E. A. (2020), Excess C/H in Protoplanetary Disk Gas from Icy Pebble Drift Across the CO Snowline, ApJL , 891, L16.

10. **Zhang, K.**, Bergin, E. A., Schwarz, K., Krijt, S., & Ciesla, F. (2019), Systematic Variations of CO Gas Abundance with Radius in Gas-rich Protoplanetary Disks, ApJ, 883, 98.

9. **Zhang, K.**, Bergin, E. A., Blake, G. A., Cleeves, L. I., & Schwarz, K. R. (2017), Mass inventory of the giant-planet formation zone in a solar nebula analogue, Nature Astronomy, 1, 0130.

8. **Zhang, K.**, Bergin, E. A., Blake, G. A., Cleeves, L. I., Hogerheijde, M., Salinas, V.,& Schwarz, K. R. (2016), On the Commonality of 10-30 AU Sized Axisymmetric Dust Structures in Protoplanetary Disks, ApJL , 818, L16.

7. **Zhang, K.**, Blake, G. A., & Bergin, E. A. (2015), Evidence of Fast Pebble Growth Near Condensation Fronts in the HL Tau Protoplanetary Disk, ApJL , 806, L7.

6. **Zhang, K.**, Crockett, N., Salyk, C., Pontoppidan, K., Turner, N. J., Carpenter, J. M., & Blake, G. A. (2015), Dimming and CO absorption toward the AA Tau protoplanetary disk: An infalling flow caused by disk instability?, ApJ, 805, 55.

5. **Zhang, K.**, Pontoppidan, K. M., Salyk, C., & Blake, G. A. (2013), Evidence for a Snow Line beyond the Transitional Radius in the TW Hya Protoplanetary Disk, ApJ, 766, 82.

4. **Zhang, K.**, Isella, A., Carpenter, J. M., & Blake, G. A. (2014), Comparison of the Dust and Gas Radial Structure in the Transition Disk [PZ99] J160421.7-213028, ApJ, 791, 42.

3. **Zhang, K.**, Jiang, B. W., & Li, A. (2009), On Magnesium Sulfide as the Carrier of the 30 μm Emission Feature in Evolved Stars, ApJ, 702, 680.

2. **Zhang, K.**, Jiang, B. W., & Li, A. (2009), On the carriers of the 21μm emission feature in post-asymptotic giant branch stars, MNRAS, 396, 1247.

1. **Zhang, K.**, Jiang, B.-W., & Li, A.-G. (2006), The 21 micron feature in the circumstellar envelopes around highly evolved stars, Progress in Astronomy, 24, 43.

Book Chapters

Zhang, K., 2024, Chemistry in Protoplanetary Disks, Chapter 2 in the Reviews in Mineralogy and Geochemistry (RiMG) Volume 90 on "Exoplanets: Compositions, Mineralogy, and Evolution"

Co-author publications

65. Miley, J. M., Pérez, L. M., Agurto-Gangas, C., Sierra, A., Trapman, L., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). XII. Extreme Millimeter Variability Detected in a Class II Disk, ApJ, 989, 11.

64. Vioque, M., Kurtovic, N. T., Trapman, L., Sierra, A., Pérez, L. M., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). X. Dust Substructures, Disk Geometries, and Dust-disk Radii, ApJ, 989, 9.

63. Anania, R., Rosotti, G. P., Gárate, M., Pinilla, P., Vioque, M., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). VIII. The Impact of External Photoevaporation on Disk Masses and Radii in Upper Scorpius, ApJ, 989, 8.

62. Tabone, B., Rosotti, G. P., Trapman, L., Pinilla, P., Pascucci, I., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). VII. Testing Accretion Mechanisms from Disk Population Synthesis, ApJ, 989, 7.

61. Kurtovic, N. T., Gárate, M., Pinilla, P., **Zhang, K.**, Rosotti, G. P., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). VI. Comparison of Dust Evolution Models to AGE-PRO Observations, ApJ, 989, 6.

60. Agurto-Gangas, C., Pérez, L. M., Sierra, A., Miley, J., **Zhang, K.**, et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). IV. Dust and Gas Disk Properties in the Upper Scorpius Star-forming Region, ApJ, 989, 4.

59. Deng, D., Vioque, M., Pascucci, I., Pérez, L. M., **Zhang, K.**, et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). III. Dust and Gas Disk Properties in the Lupus Star-forming Region, ApJ, 989, 3.

58. Ruiz-Rodriguez, D. A., González-Ruilova, C., Cieza, L. A., **Zhang, K.**, Trapman, L., et al. (2025), The ALMA Survey of Gas Evolution of PROtoplanetary Disks (AGE-PRO). II. Dust and Gas Disk Properties in the Ophiuchus Star-forming Region, ApJ, 989, 2.

57. Trapman, L., Longarini, C., Rosotti, G. P., Andrews, S. M., Bae, J., et al. (2025), exoALMA. XIII. Gas Masses from N_2H^+ and C¡SUP¿18¡/SUP¿O: A Comparison of Measurement Techniques for Protoplanetary Gas Disk Masses, ApJL , 984, L18.

56. Salyk, C., Pontoppidan, K. M., Banzatti, A., Bergin, E., Arulanantham, N., Najita, J., Blake, G. A., Carr, J., **Zhang, K.**, & Xie, C. (2025), Emission from Multiple Molecular Isotopologues in a High-inclination Protoplanetary Disk, AJ, 169, 184.

55. Houge, A., Krijt, S., Banzatti, A., Blake, G. A., Pinilla, P., Pontoppidan, K. M., Trapman, L., Williams, J., & **Zhang, K.** (2025), Smuggling unnoticed: towards a 2D view of water and dust delivery to the inner regions of protoplanetary discs, MNRAS, 537, 691.

54. Long, F., Pascucci, I., Houge, A., Banzatti, A., Pontoppidan, K. M., et al. (2025), The First JWST View of a 30-Myr-old Protoplanetary Disk Reveals a Late-stage Carbon-rich Phase, ApJL , 978, L30.

53. Calahan, J. K., Bergin, E. A., van't Hoff, M., Booth, A. S., Öberg, K.,**Zhang, K.**, Calvet, N., Hartmann, L. (2024), Complex Organics Surrounding the FU Ori–type Object V1057 Cyg Indicative of Sublimated Ices, ApJ, 975, 170.

52. Sierra, A., Pérez, L. M., Agurto-Gangas, C., Miley, J., **Zhang, K.**, et al. (2024), Hints of Planet Formation Signatures in a Large-cavity Disk Studied in the AGE-PRO ALMA Large Program, ApJ, 974, 102.

51. Calahan, J. K., Bergin, E. A., van't Hoff, M., **Zhang, K.**, Calvet, N., Hartmann, L. (2024), High Mass Inner Regions Found in Five Outbursting Sources, ApJ, 967, 158.

50. Anderson, D. E., Cleeves, L. I., Blake, G. A., Qi, C., Bergin, E. A., Carpenter, J. M., Schwarz, K. R., Thilenius, C., **Zhang, K.** (2024), Molecular Gas Tracers in Young and Old Protoplanetary Disks, ApJ, 966, 84.

49. Bergin, E. A., Bosman, A., Teague, R., Calahan, J., Willacy, K., Cleeves, L. I., Schwarz, K., **Zhang, K.**, Bruderer, S. (2024), The Carbon Isotopic Ratio and Planet Formation, ApJ, 965, 147.

48. Pontoppidan, K. M., Salyk, C., Banzatti, A.,**Zhang, K.**, Pascucci, I., et al. (2024), High-contrast JWST-MIRI Spectroscopy of Planet-forming Disks for the JDISC Survey, ApJ, 963, 158.

47. Xie, C., Pascucci, I., Long, F., Pontoppidan, K. M., Banzatti, A., et al. (2023), Water-rich Disks around Late M Stars Unveiled: Exploring the Remarkable Case of Sz 114, ApJL , 959, L25.

46. Anderson, D. E., Cleeves, L. I., Blake, G. A., Qi, C., Bergin, E. A., Carpenter, J. M., Schwarz, K. R., Thilenius, C., & **Zhang, K.** (2024), Molecular Gas Tracers in Young and Old Protoplanetary Disks, ApJ, 966, 84.

45. Bergin, E. A., Bosman, A., Teague, R., Calahan, J., Willacy, K., Cleeves, L. I., Schwarz, K.,**Zhang, K.**, & Bruderer, S. (2024), The Carbon Isotopic Ratio and Planet Formation, ApJ, 965, 147.

44. Pontoppidan, K. M., Salyk, C., Banzatti, A., **Zhang, K.**, Pascucci, I., et al. (2024), High-contrast JWST-MIRI Spectroscopy of Planet-forming Disks for the JDISC Survey, ApJ, 963, 158.

43. Banzatti, A., Pontoppidan, K. M., Carr, J. S., Jellison, E., Pascucci, I., et al. (2023), JWST Reveals Excess Cool Water near the Snow Line in Compact Disks, Consistent with Pebble Drift, ApJL , 957, L22.

42. Zhang, S., Kalscheur, M., Long, F., **Zhang, K.**, Long, D. E., Bergin, E. A., Zhu, Z., & Trapman, L. (2023), Substructures in Compact Disks of the Taurus Star-forming Region, ApJ, 952, 108.

41. Garrido-Deutelmoser, J., Petrovich, C., Charalambous, C., Guzmán, V. V., & **Zhang, K.** (2023), A Gap-sharing Planet Pair Shaping the Crescent in HD 163296: A Disk Sculpted by a Resonant Chain, ApJL , 945, L37.

40. Bae, J., Teague, R., Andrews, S. M., Benisty, M., Facchini, S., et al. (2022), Molecules with ALMA at Planet-forming Scales (MAPS): A Circumplanetary Disk Candidate in Molecular-line Emission in the AS 209 Disk, ApJL , 934, L20.

39. Anderson, D. E., Cleeves, L. I., Blake, G. A., Bergin, E. A., **Zhang, K.**, Carpenter, J. M., & Schwarz, K. R. (2022), New Constraints on Protoplanetary Disk Gas Masses in Lupus, ApJ, 927, 229.

38. Schwarz, K. R., Calahan, J. K., **Zhang, K.**, Alarcón, F., Aikawa, Y., et al. (2021), Molecules with ALMA at Planet-forming Scales. XX. The Massive Disk around GM Aurigae, ApJS, 257, 20.

37. Huang, J., Bergin, E. A., Öberg, K. I., Andrews, S. M., Teague, R., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). XIX. Spiral Arms, a Tail, and Diffuse Structures Traced by CO around the GM Aur Disk, ApJS, 257, 19.

36. Teague, R., Bae, J., Aikawa, Y., Andrews, S. M., Bergin, E. A., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). XVIII. Kinematic Substructures in the Disks of HD 163296 and MWC 480, ApJS, 257, 18.

35. Calahan, J. K., Bergin, E. A., **Zhang, K.**, Schwarz, K. R., Öberg, K. I., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). XVII. Determining the 2D Thermal Structure of the HD 163296 Disk, ApJS, 257, 17.

34. Booth, A. S., Tabone, B., Ilee, J. D., Walsh, C., Aikawa, Y., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). XVI. Characterizing the Impact of the Molecular Wind on the Evolution of the HD 163296 System, ApJS, 257, 16.

33. Bosman, A. D., Bergin, E. A., Loomis, R. A., Andrews, S. M., van't Hoff, M. L. R., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). XV. Tracing Protoplanetary Disk Structure within 20 au, ApJS, 257, 15.

32. Sierra, A., Pérez, L. M., **Zhang, K.**, Law, C. J., Guzmán, V. V., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). XIV. Revealing Disk Substructures in Multiwavelength Continuum Emission, ApJS, 257, 14.

31. Aikawa, Y., Cataldi, G., Yamato, Y., **Zhang, K.**, Booth, A. S., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). XIII. HCO^+ and Disk Ionization Structure, ApJS, 257, 13.

30. Le Gal, R., Öberg, K. I., Teague, R., Loomis, R. A., Law, C. J., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). XII. Inferring the C/O and S/H Ratios in Protoplanetary Disks with Sulfur Molecules, ApJS, 257, 12.

29. Cataldi, G., Yamato, Y., Aikawa, Y., Bergner, J. B., Furuya, K., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). X. Studying Deuteration at High Angular Resolution toward Protoplanetary Disks, ApJS, 257, 10.

28. Ilee, J. D., Walsh, C., Booth, A. S., Aikawa, Y., Andrews, S. M., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). IX. Distribution and Properties of the Large Organic Molecules HC_3N, $CH_3$3CN, and c-C_3H_2, ApJS, 257, 9.

27. Alarcón, F., Bosman, A. D., Bergin, E. A., **Zhang, K.**, Teague, R., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). VIII. CO Gap in AS 209-Gas Depletion or Chemical Processing?, ApJS, 257, 8.

26. Bosman, A. D., Alarcón, F., Bergin, E. A., **Zhang, K.**, van't Hoff, M. L. R., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). VII. Substellar O/H and C/H and Superstellar C/O in Planet-feeding Gas, ApJS, 257, 7.

25. Guzmán, V. V., Bergner, J. B., Law, C. J., Öberg, K. I., Walsh, C., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). VI. Distribution of the Small Organics HCN, C_2H, and H_2CO, ApJS, 257, 6.

24. Law, C. J., Teague, R., Loomis, R. A., Bae, J., Öberg, K. I., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). IV. Emission Surfaces and Vertical Distribution of Molecules, ApJS, 257, 4.

23. Law, C. J., Loomis, R. A., Teague, R., Öberg, K. I., Czekala, I., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). III. Characteristics of Radial Chemical Substructures, ApJS, 257, 3.

22. Czekala, I., Loomis, R. A., Teague, R., Booth, A. S., Huang, J., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). II. CLEAN Strategies for Synthesizing Images of Molecular Line Emission in Protoplanetary Disks, ApJS, 257, 2.

21. Öberg, K. I., Guzmán, V. V., Walsh, C., Aikawa, Y., Bergin, E. A., et al. (2021), Molecules with ALMA at Planet-forming Scales (MAPS). I. Program Overview and Highlights, ApJS, 257, 1.

20. Bosman, A. D., Alarcón, F., **Zhang, K.**, & Bergin, E. A. (2021), Destruction of Refractory Carbon Grains Drives the Final Stage of Protoplanetary Disk Chemistry, ApJ, 910, 3.

19. Anderson, D. E., Blake, G. A., Cleeves, L. I., Bergin, E. A., **Zhang, K.**, Schwarz, K. R., Salyk, C., & Bosman, A. D. (2021), Observing Carbon and Oxygen Carriers in Protoplanetary Disks at Mid-infrared Wavelengths, ApJ, 909, 55.

18. Calahan, J. K., Bergin, E., **Zhang, K.**, Teague, R., Cleeves, I., et al. (2021), The TW Hya Rosetta Stone Project. III. Resolving the Gaseous Thermal Profile of the Disk, ApJ, 908, 8.

17. Alarcón, F., Teague, R., **Zhang, K.**, Bergin, E. A., & Barraza-Alfaro, M. (2020), Chemical Evolution in a Protoplanetary Disk within Planet Carved Gaps and Dust Rings, ApJ, 905, 68.

16. Krijt, S., Bosman, A. D., **Zhang, K.**, Schwarz, K. R., Ciesla, F. J., & Bergin, E. A. (2020), CO Depletion in Protoplanetary Disks: A Unified Picture Combining Physical Sequestration and Chemical Processing, ApJ, 899, 134.

15. Anderson, D. E., Blake, G. A., Bergin, E. A., **Zhang, K.**, Carpenter, J. M., Schwarz, K. R., Huang, J., & Öberg, K. I. (2019), Probing the Gas Content of Late-stage Protoplanetary Disks with N_2H^+, ApJ, 881, 127.

14. Schwarz, K. R., Bergin, E. A., Cleeves, L. I., **Zhang, K.**, Öberg, K. I., Blake, G. A., & Anderson, D. E. (2019), Unlocking CO Depletion in Protoplanetary Disks. II. Primordial C/H Predictions inside the CO Snowline, ApJ, 877, 131.

13. Salyk, C., Lacy, J., Richter, M., **Zhang, K.**, Pontoppidan, K., Carr, J. S., Najita, J. R., & Blake, G. A. (2019), A High-resolution Mid-infrared Survey of Water Emission from Protoplanetary Disks, ApJ, 874, 24.

12. Rubinstein, A. E., Macías, E., Espaillat, C. C., **Zhang, K.**, Calvet, N., & Robinson, C. (2018), A Cavity of Large Grains in the Disk around the Group II Herbig Ae/Be Star HD 142666, ApJ, 860, 7.

11. Schwarz, K. R., Bergin, E. A., Cleeves, L. I., **Zhang, K.**, Öberg, K. I., Blake, G. A., & Anderson, D. (2018), Unlocking CO Depletion in Protoplanetary Disks. I. The Warm Molecular Layer, ApJ, 856, 85.

10. Chen, X. H., Li, A., & Zhang, K. (2017), On Graphene in the Interstellar Medium, ApJ, 850, 104.

9. Gerdes, D. W., Sako, M., Hamilton, S., **Zhang, K.**, Khain, T., et al. (2017), Discovery and Physical Characterization of a Large Scattered Disk Object at 92 au, ApJL , 839, L15.

8. Bergin, E. A., Du, F., Cleeves, L. I., Blake, G. A., Schwarz, K., Visser, R., & **Zhang, K**. (2016), Hydrocarbon Emission Rings in Protoplanetary Disks Induced by Dust Evolution, ApJ, 831, 101.

7. Schwarz, K. R., Bergin, E. A., Cleeves, L. I., Blake, G. A., **Zhang, K.**, Öberg, K. I., van Dishoeck, E. F., & Qi, C. (2016), The Radial Distribution of H_2 and CO in TW Hya as Revealed by Resolved ALMA Observations of CO Isotopologues, ApJ, 823, 91.

6. Blevins, S. M., Pontoppidan, K. M., Banzatti, A., **Zhang, K.**, Najita, J. R., Carr, J. S., Salyk, C., & Blake, G. A. (2016), Measurements of Water Surface Snow Lines in Classical Protoplanetary Disks, ApJ, 818, 22.

5. Salyk, C., Lacy, J. H., Richter, M. J., **Zhang, K.**, Blake, G. A., & Pontoppidan, K. M. (2015), Detection of Water Vapor in the Terrestrial Planet Forming Region of a Transition Disk, ApJL , 810, L24.

4. Salyk, C., Pontoppidan, K., Corder, S., Muñoz, D., **Zhang, K.**, & Blake, G. A. (2014), ALMA Observations of the T Tauri Binary System AS 205: Evidence for Molecular Winds and/or Binary Interactions, ApJ, 792, 68.

3. Jiang, B. W., **Zhang, K.**, Li, A., & Lisse, C. M. (2013), Crystalline Silicates in Evolved Stars. I. Spitzer/Infrared Spectrograph Spectroscopy of IRAS 16456-3542, 18354-0638, and 23239+5754, ApJ, 765, 72.

2. Bergin, E. A., Cleeves, L. I., Gorti, U., **Zhang, K.**, Blake, G. A., et al. (2013), An old disk still capable of forming a planetary system, Nature , 493, 644.

1. Jiang, B. W., **Zhang, K.**, & Li, A. (2005), On Silicon Carbide Grains as the Carrier of the 21 μm Emission Feature in Post-Asymptotic Giant Branch Stars, ApJL , 630, L77.

Talks

professional talks

- Colloquium, University of Illinois Urbana-Champaign, Illinois 04/2025
  Gas evolution in protoplanetary disks
- Colloquium, University of Virginia, Virginia 03/2025
  Gas evolution in protoplanetary disks
- Colloquium, Center of Computational Astrophysics, New York 02/2025
  Gas evolution in protoplanetary disks
- Invited talk, 245th AAS conference in Special Session: New perspectives on protoplanetary disks in the era of JWST and the ALMA Wideband Sensitivity Upgrade, Maryland, USA 01/2025
- Invited talk, Goldschmidt workshop, Chicago, USA 08/2024
  "Exoplanets: Compositions, Mineralogy, Evolution"
  Chemistry of protoplanetary disks
- Planet formation group seminar, Center of Computational Astrophysics, New York 02/2024
  Gas evolution in protoplanetary disks
- Seminar, AstroCheminar, online 01/2024
  Gas evolution in protoplanetary disks
- Colloquium, Iowa State University 10/2023
  Gas evolution in protoplanetary disks
- Seminar, *water in Protoplanetary disks*, JPL seminar 09/2023
- Invited talk, *Gas Evolution of Protoplanetary disks*
  the Origins of Solar Systems Gordon Research Conference, MA, USA 06/2023
- Seminar, UW-Madison Astronomy Monday Seminar 05/2022
- Colloquium, University of Chicago 04/2022
- Invited talk, Origins of Life, Artificial Life & Astrobiology Seminar Series of UW-Madison 03/2022
- Invited talk, "The Volatile Content of Planets that Form Early", Netherlands 11/2021
- Invited talk, "Planet-forming Disks: From Surveys to Answers", Netherlands 09/2021
- Seminar, University of Iowa, Astronomy/Space Physics Seminar 03/2021
- Invited talk, MPIA planet formation group 01/2021
- Contributed talk, AAS winter conference, online 01/2021

- Contributed talk, Astrochemical Frontiers, IAU online conference 07/2020
- Seminar, University of Arizona 11/2019
- Colloquium, Ohio State University 10/2019
- Seminar, Canadian Institute for Theoretical Astrophysics, Toronto, Canada 08/2019
- Invited talk, Community Science workshop of Origins Space Telescope 06/2019
- Contributed talk, Hubble Symposium 03/2019
- Colloquium, University of Florida 03/2019
- Colloquium, University of Wisconsin-Madison 02/2019
- Colloquium, University of Rochester 02/2019
- Contributed talk, Exoplanet research conference in the Great Lake area 12/2018
- Contributed talk, "Astrochemistry: Past, Present, and Future, Pasadena", CA 07/2018
- Contributed talk, Hubble Symposium 03/2018
- Colloquium, University of Wisconsin-Madison 03/2018
- Colloquium, University of Illinois at Urbana-Champaign 01/2018
- Invited talk, "Protoplanetary disk formation and evolution", Netherlands 07/2017
- Contributed talk, IAU Astrochemistry VII, Chile 03/2017
- Lunch talk, NRAO TUNA lunch talk 02/2017
- Invited talk, "Comets: A new vision after Rosetta/Philae", France 11/2016
- Contributed talk, "Young Solar Systems", Barcelona, Spain 04/2016
- Colloquium, University of Michigan 09/2015
- Lunch talk, CfA radio and geoastronomy division lunch talk, Chile 10/2014
- Contributed talk, AAS winter conference, Washington, D.C 01/2014
- Lunch talk, Yuk lunch seminar talk, CA 12/2013
- Lunch talk,NRAO TUNA lunch talk, Charlottesville, VA 11/2012

Public talks

- Science talk at the Space Place of the UW-Madison, Department of Astronomy 07/2022
- NASA Webb Space Telescope Community Event at Frankfort Public library district (virtual) 10/2021
- Earth 2.0, UW-Madison Astronomy Public talk series (virtual) 05/2021

Expertise

(sub)mm synthesis imaging:
Interferometric observation and data reduction for both continuum and spectral line (ALMA, NOEMA)

Infrared observation:
Spectral line and spectro-astrometric observations and high dynamic range data reduction

Radiative transfer modeling:
modeling of the thermal dust and spectral line emission from circumstellar disks, for both rotational and rovibrational tracers

Chemical evolution simulation:
modeling kinetic evolutions of molecules and ions in astronomical environments

Observing Experience

- Keck II/NIRSPEC, Mauna Kea, 20 nights
- Gemini North/Michelle, Mauna Kea, 2 nights
- CARMA, Big Pine, 31 days, array operations and commissioning
- CSO/FFTS1, Mauna Kea, 2 nights

Accepted Observing Proposals

Telescope proposals led by my group

ALMA (196.6h), JWST(133h), NOEMA (90h), VLA (8h), CARMA (58h), IRAM 30m (10h).

- **JWST GO4, Population Study of Chemistry in the First Million Years of Planet Formation: A MIRI Survey of Embedded Disks in Ophiuchus** 03/2025
  68h, PI. Zhang
- *ALMA Cycle 10, Measuring accurate gas masses for the exoALMA planet-forming disks* 08/2023
  B grade, 13.6h, PI. Trapman
- *VLA 24A, Exploring extreme pebble drift and growth in the HD 179218 protoplanetary disk* 08/2023
  A grade, 7.9h, PI. Trapman
- **JWST GO2, Building on ALMA: a JWST legacy survey of the chemical evolution of planet-forming disks** 05/2023
  65h, PI. Zhang
- *ALMA Cycle 9, A unique gas tracer of pebble drift in protoplanetary disks* 08/2022
  A grade, 9h, PI. Zhang
- ALMA Cycle 9, *Weighing the Elias 2-27 protoplanetary disk: a crucial test for a new mass measurement technique*
  A grade, 3.5 h, PI. Trapman 08/2022
- ALMA Cycle 9, *Measuring accurate gas masses of the planet-forming disks in Lupus*
  B grade, 26.5 h, PI. Trapman 08/2022
- **ALMA Cycle 8, Large program, 103 hours** (PI. Zhang, K, A grade) 08/2021
  AGE-PRO: the ALMA survey of Gas Evolution in PROtoplanetary disks
- ALMA Cycle 8, regular program 08/2021
  A unique gas tracer of pebble drift in protoplanetary disks (*B grade, 9h*)
  Physical Conditions of the Young HL Tau disk (*B grade, 3h*)
- NOEMA, *The first robust mass measurement of a Herbig disk* (*B grade, 10h*) 05/2021
- NOEMA, *CO as a Tracer of Pebble Growth and Drift in Protoplanetary disks* (*A grade, 20h*) 05/2020
- ALMA Cycle 7, *Physical Conditions of the Young HL Tau disk* (*B grade, 3.5h*) 08/2019
- NOEMA, *The Chemistry of Planet Formation within the First Myr* (*A grade, 16h*) 05/2019
- ALMA Cycle 6, *Gas mass in circumstellar disks younger than 1Myr* (*C grade, 8h*) 08/2018
- NOEMA, *Does CO depletion happen within the first Myr of disk formation* (*B grade, 9h*) 11/2017
- NOEMA, *Gas mass distribution in the HD 163296 protoplanetary disk* (*A grade, 12.4h*) 05/2017

- ALMA Cycle 4, regular program, C grade 08/2016
  Hydrocarbon emission rings in protoplanetary disks
  A Benchmark study to characterize physical structure of protostar system
- NOEMA, *Probing disk chemical changes driven by dust growth at the earliest stage* (*A grade, 8h*) 05/2016
- IRAM 30 m, *Hydrocarbon molecular emission in young disks* (*A grade, 10h*) 11/2015
- ALMA Cycle 3, *Is planet formation preferentially initiated near snowline?* (*C grade*) 08/2015
- CARMA, *Volatiles in Protoplanetary disks* (*16h*) 11/2014
- CARMA, *Volatiles in Protoplanetary disks* (*42h*) 11/2013

Telescope time approved as co-I

JWST time

- JWST GO4, *Linking the outer structure with inner chemistry in disks around the most common planet hosts*
  21.4 h, PI. Long 03/2025
- JWST GO4, *Do protoplanetary disk substructures regulate water enrichment and pebble drift across different environments hosts*
  24.4 h, PI. Huang 03/2025
- JWST GO4, *Direct detection of a multi-planet system caught in formation*
  6.2 h, PI. Ginski & Perez 03/2025
- JWST GO1, *A DSHARP-MIRI Treasury survey of Chemistry in Planet-forming Regions*
  27.7 h, PI. Salyk 03/2021
- JWST GO1, *The deepest search for rare molecules and isotopologues in planet-forming disks*
  13.4 h, PI. Pontoppidan 03/2021
- JWST GO1, *The Chemistry of Planet Formation: A JWST-ALMA Survey of 4 Planet-Forming Disks*
  12.8 h, PI. Öberg 03/2021
- JWST GO1, *Detecting a Young 2 Jupiter Mass Planet Embedded in the Disk of HD 163296*
  7.8 h, PI. Cugno 03/2021

ALMA time as co-Is

- ALMA Cycle 11, Characterizing Substructures in Disks Across All Relevant Evolutionary Stages for Planet Formation
  B grade, 36.5h, PI Nicolas Kurtovic 07/2024
- ALMA Cycle 10, *The First Kinematic Characterization of Magnetically-driven Winds in a Protoplanetary Disk using Atomic Carbon*
  A grade, 6.2 h, PI Maria Galloway-Sprietsma 08/2023
- ALMA Cycle 10, *Hunting two planet candidates from gas and dust signatures*
  B grade, 10.2 h, PI Anibal Sierra Morales 08/2023
- ALMA Cycle 9, *Dust evolution in planet-forming disks: from early stages to the end of disk lifetime*
  B grade, 33.2 h, PI. Perez 08/2022
- ALMA Cycle 9, *Witnessing Giant Planet Formation in the Act*
  B grade, 6 h, PI. Law 08/2022
- ALMA Cycle 9, *Zooming into the small disks*
  B grade, 34 h, PI. Long 08/2022
- ALMA Cycle 8, *A snowline origin for the substructures in the Class I disk GY 91?*
  B grade, 6.2 h, PI. Huang 08/2021

- ALMA Cycle 7, *A Novel Exploration of Gas Content in Protoplanetary Disks*
  A grade, 10.8 h, PI. Anderson 08/2019
- ALMA Cycle 7, *Unique Constraints on the Origin of Carbon in Terrestrial Worlds*
  A grade, 8.9 h, PI. Bergin 08/2019
- ALMA Cycle 6, *Chemistry of Planet formation*
  Large program, A grade, 130 hours, PI. Oberg, 08/2018
- ALMA Cycle 6, *Tracing Gas Dissipation in the Transition Stage*
  B grade, 7 h, PI. Anderson 08/2018
- ALMA Cycle 4, *The first constraints on the volatile Nitrogen abundance in TW Hya*
  A grade, 1.7 h, PI. Schwarz 08/2016
- ALMA Cycle 3 DDT, *Measuring the Size of a New Dwarf Planet Candidate*
  A grade, 6 h, PI. Gerdes 11/2016
- ALMA Cycle 3, *The 12C/13C isotopic ratio in protoplanetary disk* (*B grade, 1.4 h, PI. Bergin*) 08/2016
- ALMA Cycle 3, *A Novel Approach to observing the gas-dissipation timescale of protoplanetary disk*
  B grade, 6.6 h, PI. Anderson 08/2016
- ALMA Cycle 1, *Do inner disk winds have an outer disk counterpart?* (*1 h, PI. Salyk*) 09/2011

Service

External

- Selected referee of Nature, Nature Astronomy, ApJ, ApJL,
  A&A, MNRAS letters, Planetary and Space Science 2014-Present
- JWST GO4 Review Panelist 02/2025
- NASA Decadal preparation science Review Panelist 07/2024
- NASA Exoplanet Research Program Review Panelist 07/2024
- JWST GO2 External Reviewer 03/2023
- ALMA Proposal Review Panelist 06/2021
- JWST GO1 Proposal Review Panelist 02/2021
- PhD thesis committee member for Jenny Calahan, University of Michigan 11/2020-Present
- co-organizer of JWST proposal workshop at University of Michigan 03/2020
- ALMA Proposal Review Panelist 06/2019
- NASA proposal review Panelist 08/2019
- External Reviewer for NASA FINESST program 03/2019
- Hubble Space Telescope Review Panelist 05/2018
- External Reviewer for NASA emerging world program 2017
- External Reviewer for NASA Astrobiology Institute 2017
- Organizer and lecturer of NRAO/ALMA proposal workshop at UMich 03/2017
- Organizer of UM Astronomy department colloquium series 06/2017-04/2018
- IRAM NOEMA/30m Telescope Time Allocation Committee, University of Michigan 09/2015-07/2020

Service at UW-Madison

- Undergraduate faculty advisor, Astronomy Department 09/2022-Present
- Curriculum Committee member of Astronomy Department 09/2024-present
- Colloquium organizer of Astronomy Department 09/2022-05/2024
- Committee of three for graduate students in Astronomy Department 09/2020-Present
- PhD thesis committee member for Dan Rybarczyk, Astronomy Department 05/2023
- Chair of Graduate Admission Committee, Astronomy Department 09/2021-04/2022
- Member of Prelim Committee, Astronomy Department 09/2021-04/2022
- PhD thesis committee member for William Thompson, Chemistry Department 10/2021–5/2024
- PhD thesis committee member for Logan Jones, Astronomy Department 07/2021
- Member of Graduate Admission Committee, Astronomy Department 09/2020-04/2021
- Member of Strategic plan steering Committee, Astronomy Department 09/2020-08/2021
- Telescope Time Allocation Committee, Astronomy Department 09/2020-Present

Teaching and Mentoring

Teaching

- ASTRON 320, Physics of the Interstellar Medium, 2020Fall, 2022Fall, 2024Fall
- ASTRON 910, Seminar in Astrophysics 2023Fall
- ASTRON 103, The Evolving Universe: Stars, Galaxies, and Cosmology 2023Spring
- ASTRON 340, Solar System Physics 2022Spring, 2024Spring, 2025Spring
- ASTRON 700, Basic Astrophysics I - Radiation 2021Fall
- AST 401 Exoplanets, University of Michigan, Substitute Teacher 02/2019
- AST 115 Introductory Astrobiology, University of Michigan, Substitute Teacher 09/2017-11/2017
- AST 115 New Discoveries in Astronomy, University of Michigan, Guest Lecture 09/2015, 02/2016
- AY 117 Statistics and Data Analysis, Caltech, Graduate Teaching Assistant 2012Spring
- AY 125 High-Energy Astrophysics, Caltech, Graduate Teaching Assistant 2011Spring
- AY 102 Physics of the Interstellar Medium, Caltech, Graduate Teaching Assistant 2010Winter
- AY 123 Structure and Evolution of Stars, Caltech, Graduate Teaching Assistant 2010Fall
- Introduction to FORTRAN, Beijing Normal University, Graduate Teaching Assistant 2006Spring

Mentoring

Postdocs advised

- Abygail Waggoner, UW-Madison 09/2024-
- Leon Trapman, UW-Madison 11/2020-10/2024

Graduate students advised

- Eshan Raul, UW-Madison graduate student 09/2024-Present

- Tayt Armitage, UW-Madison graduate student — 09/2023-Present
  NSF Graduate Research Fellowship
- Estephani TorresVillanueva, UW-Madison graduate student — 08/2021-Present
  NSF Graduate Research Fellowship
- Jenny Calahan, UMich graduate student, co-advised with Edwin Bergin — 09/2018-07/2020
  NSF Graduate Research Fellowship
  NASA FINESST Fellowship
- Felipe Alarcon Pena, UMich graduate student, co-advised with Edwin Bergin — 09/2018-07/2020
- Christopher Merchantz, UMich, co-advised with Edwin Bergin — 09/2017-06/2018

Undergraduate students advised

- Nick Tallon, UW-Madison, co-advising with Abygail Waggoner — 09/2024-Present
  2025 UW-Madison sophomore fellowship
  2025 Wisconsin Space Consortium undergraduate research award
- Carl Yao, UW-Madison — 06/2024-Present
  2025 UW-Madison sophomore fellowship
- Nina Weichmann, UW-Madison
  2023 Wisconsin Space Consortium undergraduate research award — 02/2023-present
- Ella Chevalier, UW-Madison
  2023 UW-Madison sophomore fellowship — 09/2022-present
- Leopold Hutnik, UW-Madison, co-advised with Leon Trapman — 10/2022 – 05/2024
- Vicki Braianova, UW-Madison
  2022 UW-Madison sophomore fellowship — 09/2021-12/2022
- Anna Conly, UW-Madison REU student — 06/2021-08/2021
- Olive Zhang, UW-Madison, co-advised with Leon Trapman — 03/2021-04/2022
- Ben Capistrant, UW-Madison — 09/2020-11/2021
- Matt Kalscheur, UW-Madison post-bachelor student — 09/2020-08/2021
- Deryl Long, UMich, co-advised with Edwin Bergin — 06/2019-08/2020
- Yuan Chen, UMich visting student, co-advised with Edwin Bergin — 09/2018-01/2019
- Maria Laura Ribeiro, Post bachelor student, co-advised with Edwin Bergin — 09/2018- 03/2019
- Tia Jin, UMich, co-advised with Edwin Bergin — 09/2017-12/2017
- Jingyuan Li, Caltech, co-advised with Geoffrey Blake — 06/2011-08/2011
- Stacy King, Caltech, co-advised with Geoffrey Blake — 06/2010-08/2010