

# Chunhua Qi

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EDUCATION	<b>California Institute of Technology</b> , Pasadena, CA <i>Ph.D. in Planetary Science and Minor in Astronomy</i> <ul style="list-style-type: none"><li>• Dissertation Topic: “Aperture Synthesis Studies of the Chemical Composition of Protoplanetary Disks and Comets”</li><li>• Advisor: <i>Prof. G.A. Blake</i></li></ul>	1995 - 2000
	<b>Peking University</b> , Beijing, China <i>B.S. in Space Physics</i>	1990 - 1995
ACADEMIC EXPERIENCE	<b>Center for Astrophysics   Harvard &amp; Smithsonian</b> <i>Research Staff</i> <ul style="list-style-type: none"><li>• Conduct research in protoplanetary/debris disks and comets</li><li>• 100+ refereed papers with 8000+ citations; <i>h</i>-index = 49 (source: Astrophysics Data System)</li></ul> <i>Computer Engineer</i> <ul style="list-style-type: none"><li>• Design, develop, and maintain the MIR package, the primary data calibration software for the Submillimeter Array (SMA) interfacing with MIRIAD and CASA.</li></ul>	2003 - present
	<b>Center for Astrophysics   Harvard &amp; Smithsonian</b> <i>SMA Postdoctoral Fellow</i> <ul style="list-style-type: none"><li>• Made the first submillimeter (870 <math>\mu\text{m}</math>) image for the SMA</li></ul>	2000 - 2003
	<b>California Institute of Technology</b> <i>Research Assistant</i> <ul style="list-style-type: none"><li>• Conducted millimeter interferometric studies of protoplanetary disks and comets</li><li>• Database Maintenance, array operation for the Millimeter Array, the Owens Valley Radio Observatory</li></ul>	1995 - 2000
TEACHING EXPERIENCE	<b>Center for Astrophysics   Harvard &amp; Smithsonian</b> <i>Instructor</i> <ul style="list-style-type: none"><li>• SMA Interferometry school</li><li>• Harvard Astronomy course AY191: Astrophysics Lab</li></ul>	2021 - 2022 2005 - 2007
	<b>California Institute of Technology</b> <i>Teaching Assistant</i> <ul style="list-style-type: none"><li>• Assisted in teaching graduate courses including Introduction to the Solar System, Molecular Processes in Astronomy, Cosmochemistry, and Atmospheric Chemistry.</li></ul>	1995 - 2000
AWARDS	Smithsonian Astrophysical Observatory Certificate of Special Achievement Award	2018
SOFTWARE EXPERTISE	Highly experienced programmer with over 20 years of expertise in developing data processing software. Proven track record of designing and implementing efficient solutions to complex problems. <ul style="list-style-type: none"><li>• Proficient in IDL and Python programming</li><li>• Backward compatibility in software development</li><li>• Experienced in using Jupyter Notebook and GIT version control</li></ul>	2000 - present

PROFESSIONAL  
SOCIETIES AND  
SERVICES

*Member of:*

- AAS (American Astronomical Society)
- DPS (AAS Division for Planetary Sciences)
- IAU (International Astronomical Union)
- EAG (European Association of Geochemistry)

*Journal Referee for:*

- The Astrophysical Journal
- Astronomy & Astrophysics

*Reviewer for:*

- NASA Exoplanet Research Program
- NASA Postdoctoral Program
- ALMA Development Program
- JCMT proposals

PRESS RELEASE

*CO snow line study:*

- NRAO: <http://www.nrao.edu/pr/2013/snowline>
- ESO: <http://www.eso.org/public/news/eso1333>
- CfA: <https://www.cfa.harvard.edu/news/snow-falling-around-infant-solar-system>

*Comet study:*

- CfA: <https://www.cfa.harvard.edu/news/observing-solar-system-submillimeter-wavelengths>
- Caltech: <https://www.caltech.edu/about/news/earths-water-probably-didnt-come-comets-caltech-researchers-say-315>

INVITED TALKS AND  
SEMINARS

- 2018 May 17th, Astrophysics colloquium at the Kavli Institute for Astronomy and Astrophysics at Peking University, Beijing, China  
“Imaging Snow Lines”
- 2018 May 16th, THCA / IASTU joint Astrophysics Seminar at the Tsinghua Center for Astrophysics  
“Molecules as diagnostic probes of protoplanetary disk structure”
- 2017 July 26th, ASIAA TIARA/CHARMS Workshop in Disks, Taiwan  
“Rings and gaps, but no planets?”
- 2017 June 22nd, The 72nd International Symposium on Molecular Spectroscopy, Urbana, IL, USA  
“Probing CO Freeze-Out and Desorption in Protoplanetary Disks”
- 2016 October 10th, Fractionation of isotopes in space: from the solar system to galaxies, Florence, Italy  
“Observations of isotopic fractionation in circumstellar disks”
- 2016 August 3rd, ASIAA TIARA/CHARMS Workshop in Disks, Taiwan  
“Probing the disk structure with molecular emission ”
- 2016 March 18th, Antarctica Dome A Science Workshop, Suzhou, China  
“THz science in planet-forming disks and Solar System objects”
- 2015 October 4th, From clouds to protoplanetary disks: the astrochemical link, Berlin, Germany  
“Chemical imaging of the CO snow line in protoplanetary disks”
- 2015 August 16th, Goldschmidt 2015, Prague, CZ  
“Gas distribution in protoplanetary disks”
- 2015 June 18th, Frontiers in Star Formation: Celebrating Contributions to the Field by Nuria Calvet and Lee Hartmann, Ann Arbor, MI, USA  
“Molecules as diagnostic probes of disk structure”

- 2015 January 25th, Revealing the Structure of Protoplanetary Disks, UNAM CRyA, Morelia, Mexico  
 “Locating the CO Snow Line in Protoplanetary Disks”
- 2012 May 8th, Revealing Evolution of Protoplanetary Disks in the ALMA Era, Kyoto, Japan “Molecular Observations of Disks with the Submillimeter Array”
- 2011 March 14th, Workshop on the Chemical Taxonomy of Comets, Annapolis, Maryland  
 “Interferometric Observations of Comets”
- 2010 May 17th, Cometary Radio Astronomy Workshop, NRAO GBT  
 “Interferometric Imaging of the Outburst of Comet 17P/Holmes with the Submillimeter Array”
- 2010 March 17th, Submillimeter and THz Astrochemistry, Tokyo, Japan  
 “Chemistry in Protoplanetary Disks - an Observational Prospective”
- 2009 October 1st, JPL Astrophysics Colloquium, Pasadena, CA
- 2007 June 22nd, The North American ALMA Science Center Conference: Through Disks to Stars and Planets, Charlottesville, VA  
 “Chemistry in Disks – an Observational Perspective”
- 2006 July 16th, 36th COSPAR Scientific Assembly, Beijing, China  
 “SMA Observation of Star-Forming Regions”

SELECTED  
 CONTRIBUTED  
 TALKS

- 2019 October 14–18, ALMA 2019, Cagliari, Italy  
 “Probing Snow Surfaces in Protoplanetary Disks”
- 2018 July 10–13, ASTROCHEMISTRY Past, Present and Future, Pasadena, CA  
 “Imaging condensation fronts of CO and N<sub>2</sub> in disks”
- 2017 November 29–December 1, The Origin of Galaxies, Stars, and Planets in the era of ALMA, Pasadena, CA  
 “Imaging the CO snow line in protoplanetary disks”
- 2014 December 8–11, Revolution in Astronomy with ALMA, the 3rd Year, Tokyo, Japan  
 “Chemical Imaging of the CO Snow Line in Disks”
- 2013 June 3–7, IAUS 299: Exploring the Formation and Evolution of Planetary Systems, Victoria, Canada  
 “Observational Signatures of the CO Snow Line in Protoplanetary Disks”
- 2012 June 10–15, The Origins of Stars and Their Planetary Systems, Hamilton, ON Canada  
 “Resolving the CO Snow Line in Protoplanetary Disks”
- 2011 May 22–26, AAS 218  
 “Resolving the CO Snow Line in the Disk around HD 163296”
- 2009 June 8–12, Millimeter and Submillimeter Astronomy at High Angular Resolution, Taipei, Taiwan  
 “An SMA View of Chemistry in Disks”
- 2005 June 13–16, Submillimeter Astronomy in the era of the SMA, Cambridge, MA  
 “Constraining TW Hydra Disk Properties”

REFEREED  
 PUBLICATIONS

1. Wang, J., Qi, C., Li, S., et al. 2022, “CN 2-1 and CS 5-4 Observations toward Arp 299 with the SMA”, *The Astrophysical Journal*, **937**, 120
2. Long, F., Andrews, S. M., Zhang, S., et al. 2022, “ALMA Detection of Dust Trapping around Lagrangian Points in the LkCa 15 Disk”, *The Astrophysical Journal Letters*, **937**, L1
3. Bae, J., Teague, R., Andrews, S. M., et al. 2022, “Molecules with ALMA at Planet-forming Scales (MAPS): A Circumplanetary Disk Candidate in Molecular-line Emission in the AS 209 Disk”, *The Astrophysical Journal Letters*, **934**, L20

4. Law, C. J., Crystian, S., Teague, R., et al. 2022, “CO Line Emission Surfaces and Vertical Structure in Midinclination Protoplanetary Disks”, *The Astrophysical Journal*, **932**, 114
5. Cordiner, M. A., Coulson, I. M., Garcia-Berrios, E., et al. 2022, “A SUBLIME 3D Model for Cometary Coma Emission: The Hypervolatile-rich Comet C/2016 R2 (PanSTARRS)”, *The Astrophysical Journal*, **929**, 38
6. Kenji, F., Tsukagoshi, T., Qi, C., et al. 2022, “Detection of HC18O+ in a Protoplanetary Disk: Exploring Oxygen Isotope Fractionation of CO”, *The Astrophysical Journal*, **926**, 148
7. Huang, J., Bergin, E., Öberg, K., 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”, *The Astrophysical Journal Supplement Series*, **257**, 19
8. Calahan, J., Bergin, E., Zhang, K., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). XVII. Determining the 2D Thermal Structure of the HD 163296 Disk”, *The Astrophysical Journal Supplement Series*, **257**, 17
9. Booth, A., Tabone, B., Ilee, J., 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”, *The Astrophysical Journal Supplement Series*, **257**, 16
10. Bosman, A., Bergin, E., Loomis, R., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). XV. Tracing Protoplanetary Disk Structure within 20 au”, *The Astrophysical Journal Supplement Series*, **257**, 15
11. Sierra, A., Perez, L., Zhang, K., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). XIV. Revealing Disk Substructures in Multiwavelength Continuum Emission”, *The Astrophysical Journal Supplement Series*, **257**, 14
12. Aikawa, Y., Cataldi, G., Yamato, Y., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). XIII. HCO+ and Disk Ionization Structure”, *The Astrophysical Journal Supplement Series*, **257**, 13
13. Le Gal, R., Öberg, K., Teague, R., 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”, *The Astrophysical Journal Supplement Series*, **257**, 12
14. Bergner, J., Öberg, K., Guzman, V., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). XI. CN and HCN as Tracers of Photochemistry in Disks”, *The Astrophysical Journal Supplement Series*, **257**, 11
15. Cataldi, G., Yamato, Y., Aikawa, Y., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). X. Studying Deuteration at High Angular Resolution toward Protoplanetary Disks”, *The Astrophysical Journal Supplement Series*, **257**, 10
16. Ilee, J., Walsh, C., Booth, A., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). IX. Distribution and Properties of the Large Organic Molecules HC3N, CH3CN, and c-C3H2”, *The Astrophysical Journal Supplement Series*, **257**, 9
17. Bosman, A., Alarcon, F., Bergin, E., 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”, *The Astrophysical Journal Supplement Series*, **257**, 7
18. Zhang, K., Booth, A., Law, C., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). V. CO Gas Distributions”, *The Astrophysical Journal Supplement Series*, **257**, 5

19. Law, C., Teague, R., Loomis, R., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). IV. Emission Surfaces and Vertical Distribution of Molecules”, *The Astrophysical Journal Supplement Series*, **257**, 4
20. Law, C., Loomis, R., Teague, R., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). III. Characteristics of Radial Chemical Substructures”, *The Astrophysical Journal Supplement Series*, **257**, 3
21. Czekala, I., Loomis, R., Teague, R., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). II. CLEAN Strategies for Synthesizing Images of Molecular Line Emission in Protoplanetary Disks”, *The Astrophysical Journal Supplement Series*, **257**, 2
22. Öberg, K., Guzman, V., Walsh, C., et al. 2021, “Molecules with ALMA at Planet-forming Scales (MAPS). I. Program Overview and Highlights”, *The Astrophysical Journal Supplement Series*, **257**, 1
23. Pegues, J., Öberg, K., Bergner, J., et al. 2021, “An Atacama Large Millimeter/submillimeter Array Survey of Chemistry in Disks around M4-M5 Stars”, *The Astrophysical Journal*, **911**, 150
24. Cleeves, L., Loomis, R., Teague, R., et al. 2021, “The TW Hya Rosetta Stone Project IV: A Hydrocarbon-rich Disk Atmosphere”, *The Astrophysical Journal*, **911**, 29
25. Panic, O., Haworth, T., Petr-Gotzens, M., et al. 2021, “Planet formation in intermediate-separation binary systems”, *MNRAS*, **501**, 4
26. Terwisscha van Scheltinga, J., Hogerheijde, M., Cleeves, L., “The TW Hya Rosetta Stone Project. II. Spatially Resolved Emission of Formaldehyde Hints at Low-temperature Gas-phase Formation”, *The Astrophysical Journal*, **906**, 111
27. Öberg, K., Cleeves, L., Bergner, J., et al. 2021, “The TW Hya Rosetta Stone Project. I. Radial and Vertical Distributions of DCN and DCO+”, *The Astrophysical Journal*, **161**, 13
28. Bergner, J., Öberg, K., Bergin, E., et al. 2020, “An Evolutionary Study of Volatile Chemistry in Protoplanetary Disks”, *The Astrophysical Journal*, **898**, 97
29. Teague, R., Jankovic, M., Haworth, T., et al. 2020, “A three-dimensional view of Gomez’s hamburger”, *MNRAS*, **495**, 4
30. Flaherty, K., Hughes, A., Simon, J., et al. 2020, “Measuring Turbulent Motion in Planet-forming Disks with ALMA: A Detection around DM Tau and Non-detections around MWC 480 and V4046 Sgr”, *The Astrophysical Journal*, **895**, 109
31. Loomis, R., Öberg, K., Andrews, S., et al. 2020, “An Unbiased ALMA Spectral Survey of the LkCa 15 and MWC 480 Protoplanetary Disks”, *The Astrophysical Journal*, **893**, 101
32. Huang, J., Andrews, S., Dullemond, C., et al. 2020, “A Multifrequency ALMA Characterization of Substructures in the GM Aur Protoplanetary Disk”, *The Astrophysical Journal*, **891**, 48
33. Pergues, J., Öberg, K., Bergner, J., et al. 2020, “An ALMA Survey of H<sub>2</sub>CO in Protoplanetary Disks”, *The Astrophysical Journal*, **890**, 142
34. Booth, A., Walsh, C., Ilee, J. et al. 2019, “The First Detection of <sup>13</sup>C<sup>18</sup>O in a Protoplanetary Disk: A Robust Tracer of Disk Gas Mass”, *The Astrophysical Journal Letters*, **L31**, 7
35. Qi, C., Öberg, K. I., Espaillat, C. C., et al. 2019, “Probing CO and N<sub>2</sub> Snow Surfaces in Protoplanetary Disks with N<sub>2</sub>H<sup>+</sup> Emission”, *The Astrophysical Journal*, **882**, 160
36. Bergner, J. B., Öberg, K. I., Bergin, E. A. 2019, “A Survey of C<sub>2</sub>H, HCN, and C<sub>18</sub>O in Protoplanetary Disks”, *The Astrophysical Journal*, **876**, 25

37. Carney, M. T., Hogerheijde, M. R., Guzman, V. V. 2019, “Upper limits on CH<sub>3</sub>OH in the HD 163296 protoplanetary disk. Evidence for a low gas-phase CH<sub>3</sub>OH-to-H<sub>2</sub>CO ratio”, *Astronomy & Astrophysics*, **623**, 124
38. Guzmán, V. V., Öberg, K. I., Carpenter, J. 2018, “H<sub>2</sub>CO Ortho-to-para Ratio in the Protoplanetary Disk HD 163296”, *The Astrophysical Journal*, **864**, 170
39. Kastner, J. H., Qi, C., Dickson-Vandervelde, D. A. 2018, “A Subarcsecond ALMA Molecular Line Imaging Survey of the Circumbinary, Protoplanetary Disk Orbiting V4046 Sgr”, *The Astrophysical Journal*, **863**, 106
40. Salinas, V. N., Hogerheijde, M. R., Murillo, N. M. 2018, “Exploring DCO<sup>+</sup> as a tracer of thermal inversion in the disk around the Herbig Ae star HD 163296”, *Astronomy & Astrophysics*, **616**, 45
41. Favre, C., Fedele, D., Semenov, D. 2018, “First Detection of the Simplest Organic Acid in a Protoplanetary Disk”, *The Astrophysical Journal*, **862**, L2
42. Mauco, K., Briceno, C., Calvet, N. 2018, “Herschel PACS Observations of 4-10 Myr Old Classical T Tauri Stars in Orion OB1”, *The Astrophysical Journal*, **859**, 1
43. Law, C. J., Ricci, L., Andrews, S. M. 2017, “An SMA Continuum Survey of Circumstellar Disks in the Serpens Star-forming Region”, *The Astronomical Journal*, **154**, 255
44. Salinas, V. N., Hogerheijde, M. R., Mathews, G. S. 2017, “DCO<sup>+</sup>, DCN, and N<sub>2</sub>D<sup>+</sup> reveal three different deuteration regimes in the disk around the Herbig Ae star HD 163296”, *Astronomy & Astrophysics*, **606**, 125
45. Carney, M. T., Hogerheijde, M. R., Loomis, R. A. 2017, “Increased H<sub>2</sub>CO production in the outer disk around HD 163296”, *Astronomy & Astrophysics*, **605**, 21
46. Flaherty, K. M., Hughes, A. M., Rose, S. C., et al. 2017, “A Three-dimensional View of Turbulence: Constraints on Turbulent Motions in the HD 163296 Protoplanetary Disk Using DCO<sup>+</sup>”, *The Astrophysical Journal*, **843**, 150
47. Hily-Blant, P., Magalhaes, V., Kastner, J., et al. 2017, “Direct evidence of multiple reservoirs of volatile nitrogen in a protosolar nebula analogue”, *Astronomy & Astrophysics*, **603**, L6
48. Öberg, K. I., Guzmán, V. V., Merchantz, C. J., et al. 2017, “H<sub>2</sub>CO Distribution and Formation in the TW HYA Disk”, *The Astrophysical Journal*, **839**, 43
49. Guzmán, V. V., Öberg, K. I., Huang, J., Loomis, R., & Qi, C. 2017, “Nitrogen Fractionation in Protoplanetary Disks from the H<sub>13</sub>CN/H<sub>13</sub>CN Ratio”, *The Astrophysical Journal*, **836**, 30
50. Huang, J., Öberg, K. I., Qi, C., et al. 2017, “An ALMA Survey of DCN/H<sub>13</sub>CN and DCO<sup>+</sup>/H<sub>13</sub>CO<sup>+</sup> in Protoplanetary Disks”, *The Astrophysical Journal*, **835**, 231
51. Schwarz, K. R., Bergin, E. A., Cleeves, L. I., et al. 2016, “The Radial Distribution of H<sub>2</sub> and CO in TW Hya as Revealed by Resolved ALMA Observations of CO Isotopologues”, *The Astrophysical Journal*, **823**, 91
52. Flaherty, K. M., Hughes, A. M., Andrews, S. M., et al. 2016, “Resolved Gas Interior to the Dust Rings of the HD 141569 Disk”, *The Astrophysical Journal*, **818**, 97
53. Hogerheijde, M. R., Bekkers, D., Pinilla, P., et al. 2015, “Steepening of the 820 micron continuum surface-brightness profile signals dust evolution in TW Hya’s disk”, *Astronomy & Astrophysics*, **586**, 99
54. Guzmán, V. V., Öberg, K. I., Loomis, R., & Qi, C. 2015, “Cyanide Photochemistry and Nitrogen Fractionation in the MWC 480 Disk”, *The Astrophysical Journal*, **814**, 53

55. Qi, C., Oberg, K. I., Andrews, S. M., et al. 2015, “Chemical Imaging of the CO Snow Line in the HD 163296 Disk”, *The Astrophysical Journal*, **813**, 128
56. Kastner, J. H., Qi, C., Gorti, U., et al. 2015, “Rings of C<sub>2</sub>H in the Molecular Disks Orbiting TW Hya and V4046 Sgr”, *IAU Symposium 314*, 193
57. Öberg, K. I., Furuya, K., Loomis, R., et al. 2015, “Double DCO<sup>+</sup> Rings Reveal CO Ice Desorption in the Outer Disk Around IM Lup”, *The Astrophysical Journal*, **810**, 112
58. Rich, E. A., Wisniewski, J. P., Mayama, S., et al. 2015, “Near-IR Polarized Scattered Light Imagery of the DoAr 28 Transitional Disk”, *The astronomical Journal*, **150**, 86
59. Graninger, D., Öberg, K. I., Qi, C., & Kastner, J. 2015, “HNC in Protoplanetary Disks”, *The Astrophysical Journal*, **807**, L15
60. Espaillat, C., Andrews, S., Powell, D., Feldman, D., Qi, C., Wilner, D., D’Alessio, P. 2015, “The Transitional Disk around IRAS 04125+2902”, *The Astrophysical Journal*, **807**, 156
61. Aikawa, Y., Furuya, K., Nomura, H., & Qi, C. 2015, “Analytical Formulae of Molecular Ion Abundances and the N<sub>2</sub>H<sup>+</sup> Ring in Protoplanetary Disks”, *The Astrophysical Journal*, **807**, 120
62. Kastner, J. H., Qi, C., Gorti, U., Hily-Blant, P., Oberg, K., Forveille, T., Andrews, S., Wilner, D. 2015, “A Ring of C<sub>2</sub>H in the Molecular Disk Orbiting TW Hya”, *The Astrophysical Journal*, **806**, 75
63. Öberg, K. I., Guzmán, V. V., Furuya, K., Qi, C., Aikawa, Y., Andrews, S.M., Loomis, R., Wilner, D.J. 2015, “The comet-like composition of a protoplanetary disk as revealed by complex cyanides”, *Nature*, **520**, 198
64. Favre, C., Bergin, E. A., Cleaves, L. I., Hersant, F., Qi, C., Aikawa, Y. 2015, “Evidence for DCO<sup>+</sup> as a Probe of Ionization in the Warm Disk Surface”, *The Astrophysical Journal*, **802**, L23
65. Cleaves, L. I., Bergin, E. A., Qi, C., Adams, F. C., Öberg, K. I. 2015, “Constraining the X-Ray and Cosmic-Ray Ionization Chemistry of the TW Hya Protoplanetary Disk: Evidence for a Sub-interstellar Cosmic-Ray Rate”, *The Astrophysical Journal*, **799**, 204
66. Qi, C., Hogerheijde, M. R., Jewitt, D., Gurwell, M. A., & Wilner, D. J. 2015, “Peculiar Near-nucleus Outgassing of Comet 17P/Holmes during its 2007 Outburst”, *The Astrophysical Journal*, **799**, 110
67. Dutrey, A., Semenov, D., Chapillon, E., Gorti, U., Guilloteau, S., Hersant, F., Hogerheijde, M., Hughes, A.M., Meeus, G., Nomura, H., Pietu, V., Qi, C., Wakeham, V. 2014, “Physical and Chemical Structure of Planet-Forming Disks Probed by Millimeter Observations and Modeling”, *Protostars and Planets VI*, 317
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69. Rosenfeld, K. A., Andrews, S. M., Hughes, A. M., Wilner, D. J., & Qi, C. 2013, “A Spatially Resolved Vertical Temperature Gradient in the HD 163296 Disk”, *The Astrophysical Journal*, **774**, 16
70. Qi, C., Öberg, K. I., Wilner, D. J., et al. 2013, “Imaging of the CO Snow Line in a Solar Nebula Analog”, *Science*, **341**, 630
71. Qi, C., Öberg, K. I., Wilner, D. J., & Rosenfeld, K. A. 2013, “First Detection of c-C<sub>3</sub>H<sub>2</sub> in a Circumstellar Disk”, *The Astrophysical Journal*, **765**, L14
72. Qi, C., Öberg, K. I., & Wilner, D. J. 2013, “H<sub>2</sub>CO and N<sub>2</sub>H<sup>+</sup> in Protoplanetary Disks: Evidence for a CO-ice Regulated Chemistry”, *The Astrophysical Journal*, **765**, 34

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74. Rosenfeld, K. A., Qi, C., Andrews, S. M., Wilner, D.J., Corder, S.A., Dullemond, C.P., Lin, S., Hughes, A.M., D'Alessio, P., Ho, P.T.P. 2012, "Kinematics of the CO Gas in the Inner Regions of the TW Hya Disk", *The Astrophysical Journal*, **757**, 129
75. Öberg, K. I., Qi, C., Wilner, D. J., & Hogerheijde, M. R. 2012, "Evidence for Multiple Pathways to Deuterium Enhancements in Protoplanetary Disks", *The Astrophysical Journal*, **749**, 162
76. Espaillat, C., Ingleby, L., Hernández, J., Furlan, E., D'Alessio, P., Calvet, N., Andrews, S., Muzerolle, J., Qi, C., & Wilner, D. 2012, "On the Transitional Disk Class: Linking Observations of T Tauri Stars and Physical Disk Models", *The Astrophysical Journal*, **747**, 103
77. Andrews, S. M., Wilner, D. J., Hughes, A. M., Qi, C., Rosenfeld, K.A., Oberg, K.I., Birnstiel, T., Espaillat, C., Cieza, L.A., Williams, J.P., Lin, S., Ho, P.T.P. 2012, "The TW Hya Disk at 870  $\mu$ m: Comparison of CO and Dust Radial Structures", *The Astrophysical Journal*, **744**, 162
78. Öberg, K. I., Qi, C., Wilner, D. J., & Andrews, S. M. 2011, "The Ionization Fraction in the DM Tau Protoplanetary Disk", *The Astrophysical Journal*, **743**, 152
79. Lyo, A.-R., Ohashi, N., Qi, C., Wilner, D. J., & Su, Y.-N. 2011, "Millimeter Observations of the Transition Disk around HD 135344B (SAO 206462)", *The Astronomical Journal*, **142**, 151
80. Qi, C., D'Alessio, P., Öberg, K. I., Wilner, D. J., Hughes, A. M., Andrews, S. M., & Sandra, A. 2011, "Resolving the CO Snow Line in the Disk around HD 163296", *The Astrophysical Journal*, **740**, 84
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