

Curriculum Vitae

Richard Teague

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| CONTACT INFORMATION | Center for Astrophysics 60 Garden Street MS 78 Cambridge, MA, 02138 | (+1) 617-495-7259 https://richteague.github.io richard.d.teague@cfa.harvard.edu |
| RESEARCH EXPERIENCE | Center for Astrophysics Harvard & Smithsonian <i>Submillimeter Array Fellow</i> | Sep. 2019 – |
| | University of Michigan <i>Postdoctoral Researcher</i> | May 2017 – Jul. 2019 |
| | Max-Planck-Institute for Astronomy <i>Postdoctoral Researcher</i> | Jan. 2017 – Apr. 2017 |
| EDUCATION | Max-Planck-Institute for Astronomy , Heidelberg, Germany Ph.D. in Astronomy (Magna Cum Laude) | Oct. 2013 – Jan. 2017 |
| | University of Edinburgh , Edinburgh, United Kingdom MPhys Astrophysics (First Class Honours) | Sep. 2008 – May 2013 |
| HONOURS & AWARDS | Harvard Data Science Initiative Research Fund (\$9,700) <i>Regularized Maximum Likelihood Imaging: A New Method for Detecting Planets</i> | Mar. 2020 |
| | Ernst Patzer Award <i>Awarded for the best refereed publication by a young scientist.</i> | Nov. 2016 |
| | Pre-Honours Certificate of Merit <i>Awarded for top 5% performance in pre-honours exams.</i> | May 2011 |
| | Pre-Honours Certificate of Merit <i>Awarded for top 5% performance in pre-honours exams.</i> | May 2010 |
| PUBLICATION SUMMARY | 17 lead author papers , including one published in <i>Nature</i> , and 32 co-author papers, totaling 568 . Data taken from NASA's ADS . A full bibliography can be found at the end of the CV. | |
| OBSERVATIONAL TIME SUMMARY | I have been awarded over 82 hours (200 hours) of time on ALMA as PI (co-I), 20 hours (165 hours) on IRAM telescopes as PI (co-I) and 16 hours (30 hours) on the SMA as PI (co-I). A break down of proposals can be found below. | |
| PROFESSIONAL SERVICES | SMA Interferometry School SOC <i>SMA, Hilo, Hawaii, USA</i> | Mar. 2021 |
| | Advanced Data Analysis Techniques for ALMA SOC <i>NRAO, Charlottesville, Virginia, USA [postponed due to Covid-19]</i> | Oct. 2020 |
| | SMA Seminar Organizer <i>Departmental Seminar Series</i> | 2020 - 2021 |
| | Visualizing the Kinematics of Planet Formation SOC <i>Flatiron Institute, New York City, USA</i> | Oct. 2019 |
| | Postdoc and Research Scientist DEI Representative <i>Department Diversity, Equity and Inclusion Committee Member</i> | 2018 – 2019 |
| | Equi-Tea Organizer <i>Diversity, Equity and Inclusion Journal Club</i> | 2018 – 2019 |
| | Stars, Planets and Formation Seminar Organizer <i>Departmental Seminar Series</i> | 2018 – 2019 |
| | Conversations on Equity and Inclusion Co-organizer <i>Joint Physics / Astronomy / Space Sciences DEI Colloquium Series</i> | 2018 – 2019 |

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| | NESSF External Reviewer | 2018, 2020 |
| | Heidelberg MPG Student Workshop Organizer | 2016 |
| | PSF Coffee Organizer <i>Departmental Seminar Series</i> | 2015 – 2017 |
| | MPIA Student Representative | 2015 – 2017 |
| | MPIA Student Workshop Organizer | 2015, 2016 |
| | IMPRS Graduate Student Representative | 2013 – 2017 |
| | Referee for AAS, A&A, MNRAS and Nature journals | |
| SUPERVISION | Haochuan Yu Beijing Normal University <i>Undergraduate student.</i> | 2020 |
| | Alessandra Canta Harvard University <i>Undergraduate student. Co-supervised with Karin Öberg, Harvard</i> | 2020 |
| | Felipe Alcaron University of Michigan <i>Graduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich.</i> | 2019 – 2020 |
| | Jenny Calahan University of Michigan <i>Graduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich.</i> | 2019 – 2020 |
| | Deryl Long University of Michigan <i>Undergraduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich.</i> | 2019 |
| | Case Hazewinkel University of Michigan <i>Undergraduate student. Co-supervised with Ted Bergin, UMich.</i> | 2019 |
| | Jeanne Kwon University of Michigan <i>Undergraduate Research Opportunity Program</i> | 2018 – 2019 |
| | Julian Penzinger Ludwig Maximilian University <i>Summer student. Co-supervised with Dmitry Semenov, MPIA.</i> | 2016, 2018 |
| TALKS & SEMINARS | Planet-forming Disks: From Surveys to Answers <i>Lorentz Center Workshop</i> | Sep. 2021 (invited) |
| | Caltech Dix Planetary Science Department Seminar <i>Planet Formation in 6D</i> | Feb.. 2021 (invited) |
| | Research Unit Transition Disks (RUTD) Conference <i>Observing the Dynamics of Planet Disk Interactions</i> | Oct. 2020 (invited) |
| | From Clouds to Planets II: The Astrochemical Link <i>ALMA's 3D View of Planet Formation [postponed due to Covid-19]</i> | Oct. 2020 (invited) |
| | Exoplanets III <i>Kinematical Detection and Characterizing of Protoplanets with ALMA</i> | July 2020 |
| | MPIA Königstuhl Colloquium <i>Visualizing the Assembly of Planetary Systems</i> | July 2020 (invited) |
| | JPL Astrophysics Colloquium <i>Witnessing the Dynamics of Planetary Assembly</i> | Nov. 2019 (invited) |
| | Visualizing the Kinematics of Planet Formation <i>Exploiting ALMA's Potential for Planet Hunting</i> | Oct. 2019 |
| | Gordon Research Seminar <i>Unveiling the Dynamics of Planet Formation</i> | June 2019 |
| | IAU Symposium 350: Laboratory Astrophysics <i>The Physical Conditions of Planet Formation with Molecular Excitation</i> | Apr. 2019 (invited) |
| | Planet-Forming Disks <i>Unveiling the Dynamics of Planet Formation</i> | Mar. 2019 (invited) |

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| | NAOJ Theoretical Astronomy Seminar <i>Observing the Kinematics of Planet-Disk Interactions with ALMA</i> | Oct. 2018 (invited) |
| | LMU Munich Astronomy Colloquium <i>Using Kinematics to Search for Embedded Protoplanets</i> | Aug. 2018 (invited) |
| | University of Tübingen Astronomy Seminar <i>Kinematical Detections of Embedded Protoplanets</i> | Aug. 2018 (invited) |
| | Astrophysical Frontiers in the Next Decade and Beyond <i>The First Kinematical Detection of Embedded Protoplanets</i> | Apr. 2018 |
| | Magnetic Fields or Turbulence <i>A Spatially Resolved Search for Turbulence in TW Hya</i> | Feb. 2018 |
| | MPIA Patzer Awards Colloquium <i>Measuring Turbulence in TW Hya with ALMA: Methods and Limitations</i> | Nov. 2016 (invited) |
| | MPIA Königstuhl Colloquium <i>Observing the Earliest Stages of Planet Formation</i> | Nov. 2016 (invited) |
| | Astrochemistry with ALMA Cycle 4 <i>Detecting Turbulence in Protoplanetary Disks</i> | Jun. 2016 (invited) |
| | Sant-Cugat Forum on Astrophysics <i>Turbulence in Protoplanetary Disks: Methods and Limitations</i> | Apr. 2016 |
| | Protoplanetary Discussions <i>Turbulence in TW Hya</i> | Mar. 2016 |
| | Chemical Diagnostics of Star and Planet Formation <i>Deuterium Fraction in Protoplanetary Disks</i> | Jan. 2015 (invited) |
| | ZAG - IPAG - MPIA Workshop on Planet Formation <i>Deuterium Fraction in DM Tau</i> | Jan. 2015 (invited) |
| SUCCESSFUL TELESCOPE PROPOSALS (AS PI) | SMA PI: Teague, R. , 6 hours, 2020A-S033, B ranked <i>A 3D Exploration of an Edge-On Self-Gravitating Disk</i> | 2020b |
| | SMA PI: Teague, R. , 10 hours, 2020A-S033, A ranked <i>A 3D Exploration of an Edge-On Self-Gravitating Disk</i> | 2020a |
| | ALMA PI: Teague, R. , 13.8 hours, 2019.1.01357.S, A ranked <i>Constraining the H₂ Surface Density Profile in IM Lup</i> | 2019 |
| | ALMA PI: Teague, R. , 3.0 hours, 2019.1.00794.S, B ranked <i>Detecting the Photoevaporative Wind in IM Lup</i> | 2019 |
| | ALMA PI: Teague, R. , 33.2 hours, 2019.1.00419.S, B ranked <i>Mapping the 3D Kinematic Structure of Planet Formation</i> | 2019 |
| | ALMA PI: Teague, R. , 20.2 hours, 2018.A.00021.S, DDT <i>Confirmation of an Embedded Planet in the Disk of TW Hya</i> | 2019 |
| | Magellan/MagAO PI: Teague, R. , 6 hours <i>Searching for Wide Separation Planets in AS 209</i> | 2018 |
| | ALMA PI: Teague, R. , 6.7 hours, 2018.1.00980.S, A ranked <i>An Unambiguous Detection of a Magnetic Field in a Protoplanetary Disk</i> | 2018 |
| | ALMA PI: Teague, R. , 5.3 hours, 2016.1.00440.S, A ranked <i>Model Independent Study of Turbulence and Temperature in TW Hya</i> | 2016 |
| | IRAM PdBI PI: Teague, R. , 19.9 hours, W14BI, C ranked <i>Disk Diagnostics with Deuteration</i> | 2014 |
| (AS CO-I) | Including over 200 hours with ALMA , 150 hours with IRAM telescopes, 30 hours with the SMA , 50 hours with the VLA , 25 hours with VLT (X-shooter and SPHERE), and 2 nights with Magellan (MagAO/MagAOx). | |

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| OUTREACH | University of Michigan Lowbrow Astronomers <i>How to Find Baby Planets</i> | Nov. 2020 |
| SCHOOL PARTICIPATION | 45th Saas-Fee Course <i>From Protoplanetary Disks to Planet Formation</i> | 2015 |
| | Heidelberg Graduate School on Fundamental Physics | 2015 |
| | DIANA Protoplanetary Disk School | 2014 |
| OBSERVING EXPERIENCE | Sub-Millimeter Array <i>Monthly rota</i> | Sep. 2019 – |
| | MPG/ESO 2.2m <i>14 nights</i> | 2016 |
| TEACHING | Wavefront Analysis Laboratory Instructor | 2014 |
| PUBLICATIONS (LEAD AUTHOR) | <p>Disk Dynamics Collaboration, et al., PASA, under review <i>Vizualizing the Kinematics of Planet Formation [corresponding author]</i></p> <p>Teague, R., Hull, C. L. H., Bergin, E. A., et al., ApJ, under review <i>Sub-mm Polarization in the Disk of TW Hya</i></p> <p>Teague, R. Loomis, R. A., ApJ, 899 <i>The Excitation Conditions of CN in TW Hya</i></p> <p>Teague, R., Jankovic, M. R., Haworth, T. J., et al., MNRAS, 495 <i>A Three Dimensional View of Gomez's Hamburger</i></p> <p>Teague, R., 2019, IAU Proceedings Series, in press. <i>Tracing The Physical Conditions of Planet Formation with Molecular Excitation</i></p> <p>Teague, R., Bae, J., Huang, J., Bergin, E. 2019, ApJL, 884 <i>Spiral Structure in the Gas Disk of TW Hya</i></p> <p>Teague, R., Bae, J., Bergin, E. 2019, Nature, 574 <i>Meridional Flows in the Disk Around a Young Star</i></p> <p>Teague, R., 2019, Journal of Open Source Software, 4 <i>GoFish: Fishing for Line Observations in Protoplanetary Disks</i></p> <p>Teague, R., 2019, RNAAS, 3 <i>Statistical Uncertainties in Moment Maps of Line Emission</i></p> <p>Teague, R., 2019, Journal of Open Source Software, 4 <i>eddy: Extracting Protoplanetary Disk Dynamics with Python</i></p> <p>Teague, R., Bae, J., Birnstiel, T. & Bergin, E., 2018, ApJ, 868 <i>Evidence For A Vertical Dependence on the Pressure Structure in AS 209</i></p> <p>Teague, R. & Foreman-Mackey, D., 2018, RNAAS, 2 <i>A Robust Method to Measure Centroids of Spectral Lines</i></p> <p>Teague, R., Henning, T., Guilloteau, S., et al., 2018, ApJ, 864 <i>Temperature, Mass, and Turbulence: A Spatially Resolved Multiband Non-LTE Analysis of CS in TW Hya</i></p> <p>Teague, R., Bae, J., Bergin, E. A., et al., 2018, ApJL, 860 <i>A Kinematical Detection of Two Embedded Jupiter-mass Planets in HD 163296</i></p> <p>Teague, R., Semenov, D., Gorti, U., et al., 2017, ApJ, 835 <i>Surface Density Perturbations in the TW Hydrae Disk at 95 au Traced by Molecular Emission</i></p> <p>Teague, R., Guilloteau, S., Semenov, D., et al., 2016, A&A, 592 <i>Measuring turbulence in TW Hya with ALMA: methods and limitations</i></p> <p>Teague, R., Semenov, D., Guilloteau, S., et al., 2015, A&A, 574 <i>Chemistry in disks. IX. Observations and modelling of HCO⁺ and DCO⁺ in DM Tauri</i></p> | |

(CO-AUTHOR)

- Garufi, A., Podio, L., Codella, C., et al., A&A, in press
ALMA chemical survey of disk-outflow sources in Taurus (ALMA-DOT V)
- Calahan, J., Bergin, E. A., Zhang, K., et al., ApJ, in press
[student paper] Uncovering the Thermal Profile of a Typical Gaseous Protoplanetary Disk
- Wölfer, L., Facchini, S., Kurtovic, N. T., et al. ApJ, in press
A highly non-Keplerian protoplanetary disc
- Terwisscha, J. v. S., Hogerheijde, M. R., Cleeves, L. I., et al., ApJ, in press
Spatially resolved emission of formaldehyde hints at low-temperature gas-phase formation
- Öberg, K., Cleeves, L. I., Bergner, J., et al., AJ, in press
Radial and vertical distributions of DCN and DCO⁺ in the TW Hya disk
- Podio, L., Garufi, A., Codella, C., et al., ApJ, in press
ALMA chemical survey of disk-outflow sources in Taurus (ALMA-DOT II)
- Alarcón, F., **Teague, R.**, Zhang, K., et al., ApJ, in press
[student paper] Chemical Evolution in a Protoplanetary Disk with Dust Substructures
- White, J. A., Kóspál, Á, Hughes, A. G. Hughes, et al., ApJ, 904
ALMA and VLA Observations of EX Lupi in its Quiescent State
- Stephens, I. W., Fernández-López, M., Li, Z.-H., et al., ApJ, 901
Low Level Carbon Monoxide Line Polarization in two Protoplanetary Disks
- Hall, C., Dong, R., **Teague, R.**, et al., ApJ, 904
Kinematic Evidence for Gravitational Instability
- Long, D. E., Zhang, K., **Teague, R.**, et al., 2020, ApJL, 895
[student paper] Hints of a Population of Solar System Analog Planets from ALMA
- Facchini, S., Benisty, M., Bae, J., et al., 2020, A&A, 639
Annular substructures in the transition disks around LkCa 15 and J1610
- Garufi, A., Codella, C., Rygl, K., et al., 2020, A&A, 636
ALMA chemical survey of disk-outflow sources in Taurus (ALMA-DOT I)
- Rosotti, G., **Teague, R.**, Dullemond, C., et al., 2020, MNRAS, 495
The Efficiency of Dust Trapping in Ringed Protoplanetary Discs
- Semenov, D. & **Teague, R.** 2020, Europhysics News, 51
Accretion disks around young stars: the cradles of planet formation
- Huang, J., Andrews, S. M., Dullemond, C. P., et al., 2020, ApJ, 891
A multi-frequency ALMA characterization of substructures in the GM Aur protoplanetary disk
- Rosotti, G., Benisty, M., Juhász, A., et al., 2020, MNRAS, 491.
Spiral arms in the proto-planetary disc HD100453 detected with ALMA
- Bae, J., Zhu, Z., Baruteau, C., et al., 2019, ApJL, 884
An Ideal Testbed for Planet-disk Interaction: Two Giant Protoplanets in Resonance Shaping the PDS 70 Protoplanetary Disk
- Isella, A., Benisty, M., **Teague, R.**, et al., 2019, ApJL, 879
Detection of Continuum Submillimeter Emission Associated with Candidate Protoplanets
- Gallo, E., **Teague, R.**, Plotkin, R. M., et al., 2019, MNRAS, 488
ALMA observations of A0620-00: fresh clues on the nature of quiescent black hole X-ray binary jets
- Schwarz, K., **Teague, R.**, Bergin, E., et al., 2019, ApJL, 876.
Line Ratios Reveal N₂H⁺ Emission Originates above the Midplane in TW Hydrae
- Keppler, M., **Teague, R.**, Bae, J., et al., 2019, A&A, 625
[student paper] Highly structured disk around the planet host PDS 70 revealed by high-angular resolution observations with ALMA
- Semenov, D., Favre, C., Fedele, D., et al., 2018, A&A, 617
Chemistry in disks. XI. Sulfur-bearing species as tracers of protoplanetary disk physics and chemistry: the DM Tau case

- Flaherty, K. M., Hughes, A. M., **Teague, R.**, et al., 2018, ApJ, 856
Turbulence in the TW Hya Disk
- Fedele, D., Tazzari, M., Booth, R., et al., 2018, A&A, 610
ALMA continuum observations of the protoplanetary disk AS 209. Evidence of multiple gaps opened by a single planet
- Flock, M., Nelson, R. P., Turner, N. J., et al., 2017, ApJ, 850
Radiation Hydrodynamical Turbulence in Protoplanetary Disks: Numerical Models and Observational Constraints
- Dutrey, A., Guilloteau, S., Piétu, V., et al., 2017, A&A, 607
The Flying Saucer: Tomography of the thermal and density gas structure of an edge-on protoplanetary disk
- Beuther, H., Linz, H., Henning, T., et al., 2017, A&A, 605
Multiplicity and disks within the high-mass core NGC 7538IRS1. Resolving cm line and continuum emission at $0.06'' \times 0.05''$ resolution
- Parfenov, S. Y., Semenov, D. A., Henning, T., et al., 2017, MNRAS, 468
On the methanol emission detection in the TW Hya disc: the role of grain surface chemistry and non-LTE excitation
- van Boekel, R., Henning, T., Menu, J., et al., 2017, ApJ, 837
Three Radial Gaps in the Disk of TW Hydrae Imaged with SPHERE
- Haworth, T. J., Ilee, J. D., Forgan, D. H., et al., 2016, PASA, 33
Grand Challenges in Protoplanetary Disc Modelling
- Feng, S., Beuther, H., Semenov, D., et al., 2016, A&A, 593
Inferring the evolutionary stages of the internal structures of NGC 7538 S and IRS1 with chemistry