

Curriculum Vitae

Richard Teague

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> University of Michigan <i>Postdoctoral Researcher</i> Max-Planck-Institute for Astronomy <i>Postdoctoral Researcher</i>	Sep. 2019 – May 2017 – Jul. 2019 Jan. 2017 – Apr. 2017
EDUCATION	Max-Planck-Institute for Astronomy , Heidelberg, Germany Ph.D. in Astronomy (Magna Cum Laude) University of Edinburgh , Edinburgh, United Kingdom MPhys Astrophysics (First Class Honours)	Oct. 2013 – Jan. 2017 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> Ernst Patzer Award <i>Awarded for the best refereed publication by a young scientist.</i> Pre-Honours Certificate of Merit <i>Awarded for top 5% performance in pre-honours exams.</i> Pre-Honours Certificate of Merit <i>Awarded for top 5% performance in pre-honours exams.</i>	Mar. 2020 Nov. 2016 May 2011 May 2010
PUBLICATION SUMMARY	15 lead author papers , including one published in <i>Nature</i> , and 45 co-author papers, totaling 1306 citations (ADS). A full publication list 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), 16 hours (30 hours) on the SMA as PI (co-I) and 8 hours (18 hours) on JWST as co-PI (co-I). I have also been a co-investigator on projects for the VLA , the VLT and the Magellan telescopes, with awards of 50 hours, 25 hour and 2 nights, respectively. A break down of PI proposals can be found at the end of the CV.	
PROFESSIONAL SERVICES	SMA Interferometry School SOC <i>SMA, Hilo, Hawaii, USA</i> Advanced Data Analysis Techniques for ALMA SOC <i>NRAO, Charlottesville, Virginia, USA [postponed due to Covid-19]</i> SMA Seminar Organizer <i>Departmental Seminar Series</i> Visualizing the Kinematics of Planet Formation SOC <i>Flatiron Institute, New York City, USA</i> Postdoc and Research Scientist DEI Representative <i>Department Diversity, Equity and Inclusion Committee Member</i> Equi-Tea Organizer <i>Diversity, Equity and Inclusion Journal Club</i> Stars, Planets and Formation Seminar Organizer <i>Departmental Seminar Series</i> Conversations on Equity and Inclusion Co-organizer <i>Joint Physics / Astronomy / Space Sciences DEI Colloquium Series</i> NESSF External Reviewer	Mar. 2021 Oct. 2020 2020 - 2021 Oct. 2019 2018 – 2019 2018 – 2019 2018 – 2019 2018 – 2019 2018, 2020

	Heidelberg MPG Student Workshop Organizer	2016
	PSF Coffee Organizer	2015 – 2017
	<i>Departmental Seminar Series</i>	
	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	2020 -
	<i>Undergraduate student.</i>	
	Alessandra Canta Harvard University	2020 -
	<i>Undergraduate student. Co-supervised with Karin Öberg, Harvard</i>	
	Felipe Alcaron University of Michigan	2019 – 2020
	<i>Graduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich.</i>	
	Jenny Calahan University of Michigan	2019 – 2020
	<i>Graduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich.</i>	
TALKS & SEMINARS	Deryl Long University of Michigan	2019
	<i>Undergraduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich.</i>	
	Case Hazewinkel University of Michigan	2019
	<i>Undergraduate student. Co-supervised with Ted Bergin, UMich.</i>	
	Jeanne Kwon University of Michigan	2018 – 2019
	<i>Undergraduate Research Opportunity Program</i>	
	Julian Penzinger Ludwig Maximilian University	2016, 2018
	<i>Summer student. Co-supervised with Dmitry Semenov, MPIA.</i>	
	Munich Join Astronomical Colloquium	Oct. 2021
	<i>Mapping the Assembly of Planetary Systems in 6 Dimensions</i>	<i>(invited)</i>
	ETH Zurich Exoplanets & Habitability Seminar	May. 2021
	<i>Witnessing the Assembly of Planetary Systems</i>	<i>(invited)</i>
	Cambridge Exoplanet Center Seminar	May. 2021
	<i>Witnessing the Assembly of Planetary Systems</i>	<i>(invited)</i>
	Towards the Comprehensive Characterization of Exoplanets: Science at the Interface of Multiple Measurement Techniques	Apr. 2021
	<i>Transforming ALMA into a Planet Hunting Facility</i>	
	McMaster University Astrophysics Seminar	Apr. 2021
	<i>Witnessing the Assembly of Planetary Systems</i>	<i>(invited)</i>
	Circumplanetary Disks II	Mar. 2021
	<i>Observations and Observational Predictions</i>	<i>(invited)</i>
	Max Planck Research Group Selection Symposium	Feb. 2021
	<i>Witnessing the Assembly of Planetary Systems</i>	<i>(invited)</i>
	Caltech Dix Planetary Science Department Seminar	Feb. 2021
	<i>Planet Formation in Six Dimensions</i>	<i>(invited)</i>
	Five Years After HL Tau: A New Era in Planet Formation	Dec. 2020
	<i>Observing the Kinematics of Gaseous Substructures</i>	
	Research Unit Transition Disks (RUTD) Conference	Oct. 2020
	<i>Observing the Dynamics of Planet Disk Interactions</i>	<i>(invited)</i>
	From Clouds to Planets II: The Astrochemical Link	Oct. 2020
	<i>ALMA's 3D View of Planet Formation [postponed due to Covid-19]</i>	<i>(invited)</i>
	Exoplanets III	July 2020
	<i>Kinematical Detection and Characterizing of Protoplanets with ALMA</i>	

	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)
	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)	JWST co-PIs: Cugno, G. & Teague, R., 8 hours, 2153, <i>Detecting a Young 2 Jupiter Mass Planet Embedded in the Disk of HD 163296</i>	Cycle 1
	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 , 50 hours with VLT (X-SHOOTER, SPHERE and CRIRES), 2 nights with Magellan (MagAO/MagAOx) and 18 hours with JWST .	
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)	Teague, R. & Loomis, R. A., ApJ, 899 <i>The Excitation Conditions of CN in TW Hya</i>	
	Teague, R. , Jankovic, M. R., Haworth, T. J., et al., MNRAS, 495 <i>A Three Dimensional View of Gomez's Hamburger</i>	
	Teague, R. , 2019, IAU Proceedings Series, 350 <i>Tracing The Physical Conditions of Planet Formation with Molecular Excitation</i>	
	Teague, R. , Bae, J., Huang, J., Bergin, E. 2019, ApJL, 884 <i>Spiral Structure in the Gas Disk of TW Hya</i>	
	Teague, R. , Bae, J., Bergin, E. 2019, Nature, 574 <i>Meridional Flows in the Disk Around a Young Star</i>	
	Teague, R. , 2019, Journal of Open Source Software, 4 <i>GoFish: Fishing for Line Observations in Protoplanetary Disks</i>	
	Teague, R. , 2019, RNAAS, 3 <i>[non-refereed] Statistical Uncertainties in Moment Maps of Line Emission</i>	
	Teague, R. , 2019, Journal of Open Source Software, 4 <i>eddy: Extracting Protoplanetary Disk Dynamics with Python</i>	
	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>	
	Teague, R. & Foreman-Mackey, D., 2018, RNAAS, 2 <i>[non-refereed] A Robust Method to Measure Centroids of Spectral Lines</i>	
	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>	
	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>	

Teague, R., Semenov, D., Gorti, U., et al., 2017, ApJ, 835
Surface Density Perturbations in the TW Hydrae Disk at 95 au Traced by Molecular Emission

Teague, R., Guilloteau, S., Semenov, D., et al., 2016, A&A, 592
Measuring turbulence in TW Hya with ALMA: methods and limitations

Teague, R., Semenov, D., Guilloteau, S., et al., 2015, A&A, 574
Chemistry in disks. IX. Observations and modelling of HCO^+ and DCO^+ in DM Tauri

(CO-AUTHOR)

All papers with a substantial component of student supervision are marked.

Benisty, M., Bae, J., Facchini, S., et al., ApJL, 916
A Circumplanetary Disk Around PDS 70c

Andrews, S. M., Elder, W., Zhang, S., et al., ApJ, in press
Limits on Millimeter Continuum Emission from Circumplanetary Material in the DSHARP Disks

Long, F., Andrews, S. M., Vega, J., et al., ApJ, in press
The Architecture of the V892 Tau System: the Binary and its Circumbinary Disk

Rich, E., **Teague, R.**, Monnier, J., et al. ApJ, 913
Are Small Dust Grains actually coupled to the Gas in Protoplanetary Disks?

Pegues, J., Öberg, K. I., Bergner, J. B., et al., ApJ, 911
An ALMA Survey of Chemistry in Disks around Late-Type M-Stars

Facchini, S., **Teague, R.**, Bae, J., et al. ApJ, in press
The chemical inventory of the planet-hosting disk PDS 70

Boehler, Y., Ménard, F., Robert, C. M. T., et al. A&A, 650
Vortex-like kinematic signal, spirals, and beam smearing effect in the HD 142527 disk

Bae, J., **Teague, R.**, Zhu, Z., ApJ, 912
Tightly-Wound Spirals Driven by Buoyancy Resonance in Protoplanetary Disks

Cleeves, L. I., Loomis, R. A., **Teague, R.**, et al., ApJ, 911
The TW Hya Rosetta Stone Project IV: A hydrocarbon rich disk atmosphere

Pegues, J., Czekala, I., Andrews, S. M., ApJ, 908
Dynamical Masses and Stellar Evolutionary Model Predictions of Low-Mass M-Stars

Harrison, R. E., Looney, L. W., Stephens, I. W., et al., ApJ, 908
ALMA CN Zeeman Observations of AS 209: Limits on Magnetic Field Strength and Magnetically Driven Accretion Rate

Garufi, A., Podio, L., Codella, C., et al., A&A, 645
ALMA chemical survey of disk-outflow sources in Taurus (ALMA-DOT V)

Calahan, J., Bergin, E. A., Zhang, K., et al., ApJ, 908
[student paper] Uncovering the Thermal Profile of a Typical Gaseous Protoplanetary Disk

Wölfler, L., Facchini, S., Kurtovic, N. T., et al. A&A, 648
A highly non-Keplerian protoplanetary disc

Terwisscha, J. v. S., Hogerheijde, M. R., Cleeves, L. I., et al., ApJ, 906
Spatially resolved emission of formaldehyde hints at low-temperature gas-phase formation

Öberg, K., Cleeves, L. I., Bergner, J., et al., AJ, 161
Radial and vertical distributions of DCN and DCO^+ in the TW Hya disk

Podio, L., Garufi, A., Codella, C., et al., A&A, 644
ALMA chemical survey of disk-outflow sources in Taurus (ALMA-DOT II)

Alarcón, F., **Teague, R.**, Zhang, K., et al., ApJ, 905
[student paper] Chemical Evolution in a Protoplanetary Disk with Dust Substructures

White, J. A., Kóspál, Á., Hughes, A. G. Hughes, et al., 2020, ApJ, 904
ALMA and VLA Observations of EX Lupi in its Quiescent State

Stephens, I. W., Fernández-López, M., Li, Z.-H., et al., 2020, 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 Disk

Isella, A., Benisty, M., **Teague, R.**, et al., 2019, ApJL, 879
Detection of Continuum Submillimeter Emission Associated with Candidate Protoplanets

Cleeves, L. I., Loomis, R. A., **Teague, R.**, et al., 2019, BAAS, 51
Realizing the Unique Potential of ALMA to Probe the Gas Reservoir of Planet Formation

Lyra, W., Haworth, T., Bitsch, B., et al., 2019, BAAS, 51
Planet formation – The case for large efforts on the computational side

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

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 7538 IRS1.

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