## Richard Teague

## Curriculum Vitae

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 & S Submillimeter Array Fellow	mithsonian Sep. 2019 –	
	University of Michigan Postdoctoral Researcher	May 2017 – Jul. 2019	
	Max-Planck-Institute for Astronomy Postdoctoral Researcher	Jan. 2017 – Apr. 2017	
Education	EDUCATION Max-Planck-Institute for Astronomy, Heidelberg, Germany Ph.D. in Astronomy (Magna Cum Laude) Oct. 2013 –		
	University of Edinburgh, Edinburgh, University of Edinburgh, University	sted Kingdom Sep. 2008 – May 2013	
Honours & Awards	Harvard Data Science Initiative Research Fund (\$9,700) Mar. 20.  Regularized Maximum Likelihood Imaging: A New Method for Detecting Planets		
	Ernst Patzer Award  Awarded for the best refereed publication by a young	$\label{eq:Nov.2016} \text{Nov. 2016}$ $scientist.$	
	Pre-Honours Certificate of Merit  Awarded for top 5% performance in pre-honours exa	May 2011	
	Pre-Honours Certificate of Merit  Awarded for top 5% performance in pre-honours exa	May 2010	
Publication Summary	16 first author papers, including one published in <i>Nature</i> , and 25 co-author papers, totaling 505 citations. 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 <b>82 hours</b> (200 hours) of time on ALMA as PI (co-I), <b>20 hours</b> (150 hours) on IRAM telescopes as PI (co-I) and <b>10 hours</b> (30 hours) on the SMA as PI (co-I). A break down of proposals can be found below.		
Professional Services	SMA Interferometry School SOC SMA, Hilo, Hawaii, USA	Mar. 2021	
	Advanced Data Analysis Techniques fo NRAO, Charlottesville, Virginia, USA [postponed data]		

	SMA Seminar Organizer Departmental Seminar Series	2020 - 2021
	Visualizing the Kinematics of Planet Formation SOC Flatiron Institute, New York City, USA	Oct. 2019
	Postdoc and Research Scientist DEI Representative Department Diversity, Equity and Inclusion Committee Member	2018 - 2019
	Equi-Tea Organizer  Diversity, Equity and Inclusion Journal Club	2018 - 2019
	Stars, Planets and Formation Seminar Organizer  Departmental Seminar Series	2018 - 2019
	Conversations on Equity and Inclusion Co-organizer  Joint Physics / Astronomy / Space Sciences DEI Colloquium Series	2018 - 2019
	NESSF External Reviewer	2018, 2020
	Heidelberg MPG Student Workshop Organizer	2016
	PSF Coffee Organizer	2015 - 2017
	Departmental Seminar Series	
	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 Undergraduate student.	2020
	Alessandra Canta Harvard University Undergraduate student. Co-supervised with Karin Öberg, Harvard	2020
	Felipe Alcaron University of Michigan  Graduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich.	2019 - 2020
	Jenny Calahan University of Michigan  Graduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich.	2019 – 2020
	Deryl Long University of Michigan Undergraduate student. Co-supervised with Ted Bergin and Ke Zhang, UMich	2019 h.
	Case Hazewinkel University of Michigan Undergraduate student. Co-supervised with Ted Bergin, UMich.	2019
	Jeanne Kwon University of Michigan Undergraduate Research Opportunity Program	2018 - 2019
	Julian Penzinger Ludwig Maximilian University Summer student. Co-supervised with Dmitry Semenov, MPIA.	2016, 2018

Talks & Seminars	Research Unit Transition Disks (RUTD) Conference Observing the Dynamics of Planet Disk Interactions	October 2020 (invited)
	From Clouds to Planets II: The Astrochemical Link  ALMA's 3D View of Planet Formation [postponed due to Covid-19]	October 2020 (invited)
	Exoplanets III  Kinematical Detection and Characterizing of Protoplanets with ALMA	July 2020
	MPIA Königstuhl Colloquium  Visualizing the Assembly of Planetary Systems	July 2020 (invited)
	JPL Astrophysics Colloqium  Witnessing the Dynamics of Planetary Assembly	November 2019 (invited)
	Gordon Research Seminar Unveiling the Dynamics of Planet Formation	June 2019
	IAU Symposium 350: Laboratory Astrophysics Tracing The Physical Conditions of Planet Formation with Molecular Exci	Apr. 2019 tation (invited)
	Planet-Forming Disks Unveiling the Dynamics of Planet Formation	Mar. 2019 (invited)
	NAOJ Theoretical Astronomy Seminar Observing the Kinematics of Planet-Disk Interactions with ALMA	Oct. 2018 (invited)
	LMU Munich Astronomy Colloquium Using Kinematics to Search for Embedded Protoplanets	Aug. 2018 (invited)
	University of Tübingen Astronomy Seminar Kinematical Detections of Embedded Protoplanets	Aug. 2018 (invited)
	Astrophysical Frontiers in the Next Decade and Beyond The First Kinematical Detection of Embedded Protoplanets	d Apr. 2018
	Magnetic Fields or Turbulence A Spatially Resolved Search for Turbulence in TW Hya	Feb. 2018
	MPIA Patzer Awards Colloquium  Measuring Turbulence in TW Hya with ALMA: Methods and Limitations	Nov. 2016 (invited)
	MPIA Königstuhl Colloquium  Observing the Earliest Stages of Planet Formation	Nov. 2016 (invited)
	Astrochemistry with ALMA Cycle 4 Detecting Turbulence in Protoplanetary Disks	Jun. 2016 (invited)
	Sant-Cugat Forum on Astrophysics Turbulence in Protoplanetary Disks: Methods and Limitations	Apr. 2016
	Protoplanetary Discussions  Turbulence in TW Hya	Mar. 2016
	Chemical Diagnostics of Star and Planet Formation  Deuterium Fraction in Protoplanetary Disks	Jan. 2015 (invited)

	ZAG - IPAG - MPIA Workshop on Planet Formation  Deuterium Fraction in DM Tau	Jan. 2015 (invited)
SCHOOL PARTICIPATION	45th Saas-Fee Course From Protoplanetary Disks to Planet Formation	2015
	Heidelberg Graduate School on Fundamental Physics	2015
	DIANA Protoplanetary Disk School	2014
Observing Experience	Sub-Millimeter Array  Monthly rota.	2019 –
	MPG/ESO 2.2m 14 nights	2016
TEACHING	Wavefront Analysis Laboratory Instructor	2014
Successful Telescope	<b>SMA</b> PI: <b>Teague</b> , <b>R.</b> , 10 hours, 2020A-S033, A ranked A 3D Exploration of an Edge-On Self-Gravitating Disk	2020
Proposals (as pi)	<b>ALMA</b> PI: <b>Teague</b> , <b>R.</b> , 13.8 hours, 2019.1.01357.S, A ranked Constraining the H2 Surface Density Profile in IM Lup	2019
	<b>ALMA</b> PI: <b>Teague</b> , <b>R.</b> , 3.0 hours, 2019.1.00794.S, B ranked Detecting the Photoevaporative Wind in IM Lup	2019
	<b>ALMA</b> PI: <b>Teague</b> , <b>R.</b> , 33.2 hours, 2019.1.00419.S, B ranked Mapping the 3D Kinematic Structure of Planet Formation	2019
	<b>ALMA</b> PI: <b>Teague</b> , <b>R.</b> , 20.2 hours, 2018.A.00021.S, DDT Confirmation of an Embedded Planet in the Disk of TW Hya	2019
	Magellan/MagAO PI: Teague, R., 6 hours Searching for Wide Separation Planets in AS 209	2018
	<b>ALMA</b> PI: <b>Teague</b> , <b>R.</b> , 6.7 hours, 2018.1.00980.S, A ranked An Unambiguous Detection of a Magnetic Field in a Protoplanetary Disk	2018
	ALMA PI: Teague, R., 5.3 hours, 2016.1.00440.S, A ranked Model Independent Study of Turbulence and Temperature in TW Hya	2016
	<b>IRAM PdBI</b> PI: <b>Teague, R.</b> , 19.9 hours, W14BI, C ranked Disk Diagnostics with Deuteration	2014
(AS CO-I)	Including over 200 hours with <b>ALMA</b> , 150 hours with <b>IRAM</b> telescopes, 30 hours with the <b>SMA</b> , 50 hours with the <b>VLA</b> , 25 hours with <b>VLT</b> (X-shooter and SPHERE), and 2 nights with <b>Magellan</b> (MagAO/MagAOx).	

## **PUBLICATIONS**

## Disk Dynamics Collaboration, et al., PASA, in review

Vizualizing the Kinematics of Planet Formation [corresponding author]

**Teague, R.**, Hull, C. L. H., Bergin, E. A., et al., ApJ, in review Sub-mm Polarization in the Disk of TW Hya

Teague, R. Loomis, R. A., ApJ, 899

The Excitation Conditions of CN in TW Hya

**Teague, R.**, Jankovic, M. R., Haworth, T. J., et al., MNRAS, 495 A Three Dimensional View of Gomez's Hamburger

Teague, R., 2019, IAU Proceedings Series, in press.

Tracing The Physical Conditions of Planet Formation with Molecular Excitation

**Teague, R.**, Bae, J., Huang, J., Bergin, E. 2019, ApJL, 884 Spiral Structure in the Gas Disk of TW Hya

**Teague**, R., Bae, J., Bergin, E. 2019, Nature, 574 Meridional Flows in the Disk Around a Young Star

**Teague, R.**, 2019, Journal of Open Source Software, 4 GoFish: Fishing for Line Observations in Protoplanetary Disks

**Teague**, **R.**, 2019, RNAAS, 3

sion

Statistical Uncertainties in Moment Maps of Line Emission

**Teague**, R., 2019, Journal of Open Source Software, 4 eddy: Extracting Protoplanetary Disk Dynamics with Python

**Teague, R.**, Bae, J., Birnstiel, T. & Bergin, E., 2018, ApJ, 868 Evidence For A Vertical Dependence on the Pressure Structure in AS 209

**Teague**, R. & Foreman-Mackey, D., 2018, RNAAS, 2 A Robust Method to Measure Centroids of Spectral Lines

**Teague, R.**, Henning, T., Guilloteau, S., et al., 2018, ApJ, 864

Temperature, Mass, and Turbulence: A Spatially Resolved Multiband Non-LTE Analysis of CS in TW Hya

**Teague, R.**, Bae, J., Bergin, E. A., et al., 2018, ApJL, 860

A Kinematical Detection of Two Embedded Jupiter-mass Planets in HD 163296

**Teague, R.**, Semenov, D., Gorti, U., et al., 2017, ApJ, 835

A Surface Density Perturbation in the TW Hydrae Disk at 95 au Traced by Molecular Emis-

**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<sup>+</sup> and DCO<sup>+</sup> in DM Tauri

(со-Author) White, J. A., Kóspál, Á, Hughes, A. G. Hughes, et al., ApJ, in press ALMA and VLA Observations of EX Lupi in its Quiescent State

Stephens, I. W., Fernández-López, M., Li, Z.-H., et al., ApJ, in press Low Level Carbon Monoxide Line Polarization in two Protoplanetary Disks: HD 142527 and IM Lup)

Hall, C., Dong, R., **Teague**, **R.**, et al., ApJ, in press Kinematic Evidence for Gravitational Instability

Long, D. E., Zhang, K., **Teague**, **R.**, et al., 2020, ApJL, 895 Hints of a Population of Solar System Analog Planets from ALMA

Facchini, S., Benisty, M., Bae, J., et al., 2020, A&A, in press. 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, 891A multi-frequency ALMA characterization of substructures in the GM Aur protoplanetary disk

Rosotti., G., Benisty, M., Juhazs, 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 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  $0.06\hat{a}\check{A}\S\times0.05\hat{a}\check{A}\S$  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