# DR. MUNAZZA K. ALAM

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#### RESEARCH INTERESTS

Observations of exoplanet atmospheres, host star elemental abundances, planet formation and evolution

### **EMPLOYMENT**

Carnegie Earth & Planets Laboratory, Carnegie EPL Postdoctoral Fellow	2021-
Harvard University, Postdoctoral Researcher	2021

#### **EDUCATION**

Harvard University 2016–2021

Ph.D., Astronomy and Astrophysics

Thesis: "Characterizing Distant Worlds: Atmospheric Reconnaissance of Giant Planets with Hubble" Advisor: Dr. Mercedes López-Morales

A.M. (2018), Astronomy and Astrophysics

Macaulay Honors College at Hunter College, City University of New York (CUNY) 2012–2016 B.A., Physics and Astronomy – Summa Cum Laude (Salutatorian)

#### FELLOWSHIPS & GRANTS

National Geographic Young Explorers Grant	2015-
NSF Graduate Research Fellowship	2017 - 2020
John P. and Carol J. Merrill Graduate Fellowship, Harvard University	2017
Judith and Stanley Zabar Graduate Scholarship, Hunter College	2016
John P. McNulty Scholarship, Hunter College	2014 - 2016
CUNY Macaulay Honors College full merit scholarship, Hunter College	2012 - 2016

### SELECTED HONORS & AWARDS

Keck Principal Investigator Data Award, NExSci for NASA	2020, 2022
Rodger Doxsey Travel Prize, AAS 237th Meeting	2021
Nominated as one of the 40 Women to Watch in 2019, The Tempest	2019
Derek Bok Center Certificate of Distinction in Teaching, Harvard University	2017, 2018
Awarded for teaching SPU 30 (Life as a Planetary Phenomenon), Spring 2017	
Awarded for teaching AY 16 (Stellar & Planetary Astronomy), Spring 2018	
Best Poster Award, IAC Winter School of Radiative Transfer in Stellar & Planetary Atmospheres	2017
Joseph A. Gillet Memorial Prize, Hunter College	2016
Award Citation: "awarded to a member of the senior class who has, in the opinion	
of the department, the most thorough knowledge of general physics"	
Rosalyn S. Yalow Award, Hunter College	2016
Award Citation: "presented to one of Hunter's finest science students"	

## ACCEPTED OBSERVING PROPOSALS (AS PI)

- A Helium Search in Planets on the Edges of the Hot Neptune Desert and Warm Neptune Savana, Keck/NIRSPEC 2022B semester, 2 nights, **PI: Alam**, Co-Is: Bourrier, Kirk, dos Santos, Allart, López-Morales, Ehrenreich, Seidel, Attia, Jaziri, Guilluy, Dethier
- A Sharper Look: Observing a Clear Atmosphere Exoplanet Simultaneously at Low & High Spectral Resolution, Magellan/MIKE + Magellan/IMACS 2021B semester, 1 night, **PI: Alam**, Co-Is: Teske, Gao
- Probing Atmospheric Escape in Young Transiting Exoplanets, Keck II/NIRSPEC 2020B semester, 1.5 nights, **PI: Alam**, Co-Is: dos Santos, Kirk, López-Morales, Ehrenreich, Bourrier, Allart, Siedel, Lovis, Livingston, King, Oklopčić, Zhou

Investigating Giant Planet Origins with Elemental Abundances of Stellar Hosts, Keck I/HIRES 2020A semester, 0.25 nights, **PI: Alam**, Co-I: López-Morales

Investigating Giant Planet Origins: Stellar Host Elemental Abundances, Magellan/MIKE 2019A, 2020A, & 2020B semesters, 6.5 nights, **PI: Alam**, Co-Is: López-Morales, Buchhave

# SELECTED INVITED TALKS

Talk Geological Society of Washington, Exotic Exoplanets and How to Find Them	May 2022
Colloquium American University, Exoplanet Exploration with Hubble	Feb 2022
Seminar NASA ExoExplorers, The First Near-Infrared Transmission Spectrum of	Jan 2022
HIP 41378 f, a Low-Mass Temperate Jovian World in a Multi-Planet System	
Seminar Carnegie EPL, A NIR Transmission Spectrum for HIP 41378f	Dec 2021
Guest Lecture University of Windsor, Exotic Exoplanets and How to Find Them	Nov 2021
Guest Lecture American University, Exotic Exoplanets and How to Find Them	Oct 2021
Colloquium Oberlin College, Characterizing Exoplanet Atmospheres with Hubble	Oct 2021
Seminar University of Michigan, A Cloud-Free Atmosphere for WASP-62b	Oct 2020
Talk NASA Jet Propulsion Laboratory, A Clear Atmosphere for WASP-62b, the Only Known	Sept 2020
Gas Giant in the JWST Continuous Viewing Zone	
Seminar UC Berkeley & UCLA, Characterizing Giant Planet Atmospheres with Hubble	Sept 2020
Seminar University of Chicago, Characterizing Giant Planet Atmospheres with Hubble	Aug 2020
and Large Ground-based Telescopes	
Seminar University of Exeter, Characterizing Giant Planet Atmospheres with HST	Aug 2020
Talk University of Hawaii Institute for Astrophysics, Characterizing Giant Planet Atmospheres	Feb 2020
Seminar Columbia University, The HST PanCET Program: Characterizing the Atmospheres	Apr 2019
of Inflated Hot Jupiters	
Seminar Geneva Observatory, Precise Optical Transmission Spectra for a Hot Jupiter	Sept 2018
and a Nearby Super-Earth	
Seminar Pontificia Universidad Católica, An Optical Transmission Spectrum for WASP-52b	Aug 2018
Talk Smithsonian Board of Regents Meeting, Through the Looking Glass: Next Generation	Apr 2018
Telescopes and the Future of Astronomy	

## SELECTED CONTRIBUTED TALKS

Talk Exo-Webb Summer Series, Evidence of a Clear Atmosphere for WASP-62b, the Only Known	Jul 2020
Transiting Gas Giant in the JWST Continuous Viewing Zone	
Conference Cloud Academy I, An Optical Transmission Spectrum for WASP-52b	Sept 2018
Conference Exoplanets II, An Optical Transmission Spectrum of the Inflated Hot Jupiter WASP-52	b Jul 2018
Conference Boston Area Exoplanet Science Meeting 2, Precise Optical Transmission Spectra	Mar 2018
for a hot Jupiter and a nearby super-Earth	
Conference CfA Stars & Planets Science Extravaganza 2, A Tale of Two Planets	Oct 2017
Conference Keele University Transiting Exoplanets, Characterizing HD 21934b, the Nearest	Jul 2017
Transiting Rocky Planet	

## SELECTED PUBLIC TALKS

Public talk Virginia Living Museum, Weather on Other Worlds	Apr 2021
Assembly speaker Nightingale-Bamford School, My Journey as an Astronomer	Jan 2020
Public talk National Geographic Explorer Nights, Exploring the Universe	Apr 2019
Public talk National Geographic Student Matinee, Keep Looking Up: My Journey in Astronomy	Mar 2019
Public talk CfA Observatory Night, Weather on Other Worlds: Studying Exoplanet Atmospheres	Feb 2019
Keynote speaker Virginia Association of Science Teachers, Building Stronger Classrooms	Nov 2018
Keynote speaker Virginia Science Education Leadership Association, Diversify & Strengthen	Nov 2018
Science for All	
Public talk Macaulay Honors College Professional Lunch Series, My Path to Astronomy	Oct 2018
Public talk National Geographic Young Explorers Grants Program Workshop at Yale	Apr 2016
University, Brown Dwarfs: The Cool Neighbors	•

### SELECTED MEDIA FEATURES

Article Astrobites, Women's History Month: Dr. Munazza Alam	Mar 2022
Book National Geographic Kids, No Boundaries	Feb 2022
Book Millbrook Press, Who is a Scientist?	Oct 202
Magazine Harvard Gazette, Quick, hand me my worm pick	Sept 2021
Magazine Eos, Munazza Alam: Searching for New Worlds	Sept 2021
Magazine Smithsonian Magazine, The Five Big Ways JWST Will Help Astronomers	Aug 202
Understand the Universe	Aug 202
Podcast HMSC Science Connects!, Pondering Distant Suns	Jun 2020
Book National Geographic Kids, Absolute Expert: Space!	Jun 202
Magazine National Geographic, "Women: A Century of Change"	Mar 202
Radio show RMWorldTravel with Robert & Mary Carey and Rudy Maxa	Aug 201
Podcast KPCC Radio, Tell Them, I Am (Episode 20)	May 201
Magazine National Geographic Kids, "Dare to Explore"	Mar 201
Video Explorer Academy: The Truth Behind	Oct 201
Television CUNY TV Study with the Best (Culture and Identity)	May 201
Book National Geographic Kids Solve This!: Wild & Wacky Challenges for the Genius	Mar 201
Engineer in You	
Book National Geographic Kids Explorer Almanac 2019	May 201
Article National Geographic, Woman of Impact in Science, Meet Munazza Alam: the woman	Mar 201
searching for planet Earth's twin	
Article National Geographic, Finding Clarity in the Stars	Oct 201

### SELECTED OUTREACH & SERVICE

Organizer Carnegie EPL Astronomy Seminar	2022-
Subject-matter expert reviewer NASA peer review	2022
Postdoc representative Carnegie EPL Library Committee	2021-
Graduate student representative CfA Director Search Committee	2021
Student representative Harvard Graduate Admissions Committee	2021
Committee member Center for Astrophysics   Harvard & Smithsonian APS-IDEA	2020 - 2021
Coordinator Harvard Astronomy Peer Mentoring Program	2019 - 2021
Reviewer Hubble Space Telescope Proposal Review Committee, Mid-Cycles 26 & 27	2019 - 2020
Co-founder Open Labs at Harvard	2016 - 2019
Poster judge National Collegiate Research Conference	2017, 2018

# **PUBLICATIONS**

28 refereed or submitted papers, 6 first and second author (via NASA ADS).

## FIRST & SECOND AUTHOR PUBLICATIONS

- 6. Alam, M.K., Kirk, J., Dressing, C.D., López-Morales, M., Ohno, K., Gao, P., Akinsanmi, B., Santerne, A., Grouffal, S., Adibekyan, V., Barros, S.C.C., Buchhave, L., Crossfield, I.J.M., Dai, F., Deleuil, M., Giacalone, S., Lillo-Box, J., Marley, M., Mayo, A.W., Mortier, A., Santos, N.C., Sousa, S.G., Turtelboom, E.V., Wheatley, P.J., Vanderburg, A.M. The First Near-Infrared Transmission Spectrum of HIP 41378f, a Low-Mass Temperate Jovian World in a Multi-Planet System, The Astrophysical Journal Letters, 927, 1, pp.L5-L14 (2022).
- 5. Alam, M.K., López-Morales, M., MacDonald, R., Nikolov, N., Kirk, J., Goyal, J., Sing, D.K., Wakeford, H.R., Rathcke, A.D., Deming, D.L., Sanz-Forcada, J., Lewis, N.K., Barstow, J.K., Mikal-Evans, T., Buchhave, L.A. Evidence of a Clear atmosphere for WASP-62b, the Only Transiting Giant Planet in the JWST Continuous Viewing Zone, The Astrophysical Journal Letters, 906, 2, pp.L10-L20 (2021).
- 4. Alam, M.K., López-Morales, M., Nikolov, N., Sing, D.K., Henry, G.W., Baxter, C., Désert, J.M., Barstow, J.K., Mikal-Evans, T., Bourrier, V., Lavvas, P., Wakeford, H.R., Williamson, M.H., Sanz-Forcada, J., Buchhave, L., Cohen, O., García Muñoz, A. *The HST PanCET Program: An Optical to Infrared Transmission Spectrum of HAT-P-32Ab*, The Astronomical Journal, 160, 1, pp.51-70 (2020).

- 3. Kirk, J., Alam, M.K., López-Morales, M., Zeng, Li. Confirmation of WASP-107b's extended Helium atmosphere with Keck II/NIRSPEC, The Astronomical Journal, 159, 3, pp.115-124 (2020).
- Alam, M.K., Nikolov, N., López-Morales, M., Sing, D.K., Goyal, J., Henry, G.W., Sanz-Forcada, J., Williamson, M.H., Evans, T.M., Wakeford, H.R., Bruno, G., Ballester, G.E., Stevenson, K.B., Lewis, N.K., Barstow, J.K., Bourrier, V., Buchhave, L.A., Ehrenreich, D., García Muñoz, A. The HST PanCET Program: Detection of Na I & A Cloudy Atmosphere for the Inflated Hot Jupiter WASP-52b, The Astronomical Journal, 156, 6, pp. 298-323 (2018).
- 1. Riedel, A.R., Alam, M.K., Rice, E.L., Cruz, K.L., & Henry, T.J. Young Stars with SALT, The Astrophysical Journal, 840, 2, pp.87-106 (2017).

#### THIRD+ AUTHOR PUBLICATIONS

- 23. Gressier, A., Lecavelier des Etangs, A., Sing, D.K., López-Morales, M., Alam, M.K., Barstow, J.K., Bourrier, V., Dos Santos, L.A., García Muñoz, A., Lothringer, J.D., Nikolov, N.K., Sotzen, K., Henry, G.W., Mikal-Evans, T. The Hubble PanCET Program: The near-UV transmission spectrum of WASP-79b, submitted to Astronomy & Astrophysics (2022)
- 22. Weaver, I.C., Osip, D., López-Morales, M., Diamond-Lowe, H., Espinoza, N., Rackham, B., Alam, M.K., Allen, N., Apai, D., Berta-Thompson, Z., Ceballos, K., Jordán, A., Kirk, J., Lewis, N.K., McGruder, C.D. ACCESS: An optical transmission spectrum of the high-gravity, hot Jupiter WASP-50b, submitted to The Astronomical Journal (2022).
- 21. Batalha, N.E., Wolfgang, A., Teske, J., **Alam, M.K.**, Alderson, L., Batalha, N.M., López-Morales, M., Wakeford, H.R. *The Importance of Accounting for Sample Selection in Exoplanet Atmosphere Population Studies*, submitted to ApJL (2022).
- 20. Ratchke, A.D., Buchhave, L.A., Mendonça, J.M., Sing, D.K., López-Morales, M., Alam, M.K., Henry, G.W., Nikolov, N.K., García Muñoz, A., Mikal-Evans, T., Wakeford, H.R., Dos Santos, L.A. HST PanCET Program: A Flat Optical Transmission Spectrum for the Hot Jupiter WASP-101b, submitted to MNRAS (2022).
- McGruder, C.D., López-Morales, M., Kirk, J., Espinoza, N., Rackham, B.V., Alam, M.K., Allen, N., Nikolov, N., Weaver, I.C., Ortiz Ceballos, K., Osip, D.J., Apai, D., Jordán, A., Fortney, J.J. ACCESS: Confirmation of a Clear Atmosphere for WASP-96b and a Comparison of Light Curve Detrending Techniques, accepted to the Astronomical Journal (2022).
- Kirk, J., Dos Santos, L.A., López-Morales, M., Alam, M.K., Oklopčić, A., MacLeod, M., Zeng, L., Zhou, G. A Keck/NIRSPEC detection and non-detection of He I in the atmosphere of two inflated hot Jupiters orbiting K dwarfs: WASP-52b and WASP-177b, The Astronomical Journal, 164, 1, pp.24-38 (2022).
- 17. Wong, I., Chachan, Y., Knutson, H.A., Henry, G.W., Adams, D., Kataria, T., Benneke, B., Gao, P., Deming, D., López-Morales, M., Sing, D.K., Alam, M.K., Ballester, G.E., Barstow, J.K., Buchhave, L.A., Dos Santos, L.A., Fu, G., García Muñoz, A., MacDonald, R.J., Mikal-Evans, T., Sanz-Forcada, J., Wakeford, H.R. The Hubble PanCET Program: A Featureless Transmission Spectrum for WASP-29b and Evidence of Enhanced Atmospheric Metallicity on WASP-80b, The Astronomical Journal 164, 30 (2022).
- Fu, G., Sing, D.K., Deming, D., Sheppard, K., Wakeford, H.R., Mikal-Evans, T., Alam, M.K., Dos Santos, L.A., López-Morales, M. The Hubble PanCET program: Emission spectrum of hot Jupiter HAT-P-41b, The Astronomical Journal, 163, 4, pp.190-195 (2022).
- 15. Dos Santos, L.A., Vidotto, A.A., Vissapragada, S., **Alam, M.K.**, Allart, R., Bourrier, V., Kirk, J., Siedel, J.V., Ehrenreich, D. p winds: an open source Python code to model planetary winds and upper atmospheres, Astronomy & Astrophysics, 659, A62, pp.1-12 (2022).
- 14. Zeng, L., Jacobsen, S.B., Sasselov, D., Levi, A., Kirk, J., Damasso, M., Nava, C., Lacedelli, G., Piaulet, C., López-Morales, M., Petaev, M., Alam, M.K. New Perspectives on Exoplanet Radius Gap from a Mathematica Tool and Visualized Water EOS, The Astronomical Journal, 923, 2, pp.247-277 (2021).
- 13. Fu, G., Deming, D., May, E., Stevenson, K.B., Sing, D.K., Lothringer, J., Wakeford, H.R., Nikolov, N., Evans, T., Bourrier, V., Dos Santos, L., **Alam, M.K.**, Henry, G.W., García Muñoz, A., López-Morales, M. *The Hubble PanCET program: Transit and Eclipse Spectroscopy of the Hot Jupiter WASP-74b*, The Astronomical Journal, 162, 6, pp.271-294 (2021).

- 12. Rathcke, A.D., MacDonald, R.J., Barstow, J.K., Goyal, J.M., López-Morales, M., Mendo ça, J.M., Sanz-Forcada, J., Henry, G.W., Sing, D.K., Alam, M.K., Lewis, N.K., Chubb, K.L., Taylor, J., Nikolov, N., Buchaave, L.A. HST PanCET Program: A Complete Near-UV to Infrared Transmission Spectrum for the Hot Jupiter WASP-79b, The Astronomical Journal, 162, 4, pp.138-158 (2021).
- 11. Weaver, I.C., López-Morales, M., **Alam, M.K.**, Espinoza, N., Rackham, B.V., Goyal, J.M., MacDonald, R.J., Lewis, N.K., Apai, D., Bixel, A., Jordán, A., Kirk, J., McGruder, C.D., Osip, D.J. *ACCESS: An optical transmission spectrum of the high-gravity, hot Jupiter HAT-P-23b*, The Astronomical Journal, 161, 6, pp.279-301 (2021).
- McGruder, C.D., López-Morales, M., Espinoza, N., Rackham, B.V., Apai, D., Jordán, A., Osip, D.J., Alam, M.K., Bixel, A., Fortney, J.J., Henry, G.W., Kirk, J., Lewis, N.K., Rodler, F., Weaver, I.C. ACCESS: Confirmation of no potassium in the atmosphere of WASP-31b, The Astronomical Journal, 160, 5, pp.230-252 (2020).
- Carter, A.L., Nikolov, N., Sing, D.K., Alam, M.K., Goyal, J.M., Mikal-Evans, T., Wakeford, H.R., Henry, G.W., Morell, S., López-Morales, M., Smalley, B., Lavvas, P., Barstow, J.K., García Muñoz, A., Wilson, P.A., Gibson, N.P. Detection of Na, K, and H<sub>2</sub>O in the hazy atmosphere of WASP-6b, Monthly Notices of the Royal Astronomical Society, 494, 4, pp.5449-5472 (2020).
- 8. Bruno, G., Lewis, N.K., Alam, M.K., López-Morales, M., Wakeford, H.R., Barstow, J.K., Sing, D.K., Ballester, G.E., Bourrier, V., Buchhave, L.A., Cohen, O., Evans, T.M., García Muñoz, A., Lavvas, P., Sanz-Forcada, J. WASP-52b. The effect of starspot correction on atmospheric retrievals, Monthly Notices of the Royal Astronomical Society, 491, 4, pp.5361-5375 (2020).
- 7. Weaver, I., López-Morales, M., Espinoza, N., Rackham, B.V., Osip, D.J., Apai, D., Jordán, A., Bixel, A., Fortney, J.J., Lewis, N.K., Alam, M.K., Kirk, J., McGruder, C., Rodler, F., Fienco, J. ACCESS: An Optical to Near-infrared Spectrum of the Hot Jupiter WASP-43b with Evidence of H<sub>2</sub>O, and Stellar Surface Heterogeneity, but no evidence of Na or K, The Astronomical Journal, 159, 1, pp.13-34 (2020).
- Helling, C., Iro, N., Corrales, L., Samra, D., Ohno, K., Alam, M.K., Steinrueck, M., Lew, B., Molaverdikhani, K., MacDonald, R.J., Herbort, O., Woitke, P., Parmentier, V. Understanding the atmospheric properties and chemical composition of the ultra-hot Jupiter HAT-P-7b. I. Cloud and chemistry mapping, Astronomy & Astrophysics, 631, 1, pp.A79-A108 (2019).
- Riedel, A.R., diTomasso, V., Rice, E.L., Alam, M.K., Abrahams, E., Crook, J., Cruz, K.L., and Faherty, J.K. Radial Velocities, Space Motions, and Nearby Young Moving Group Memberships of Eleven Candidate Young Brown Dwarfs, The Astronomical Journal, 157, 6, pp.247-265 (2019).
- 4. Evans, T.M., Sing, D.K., Goyal, J., Nikolov, N., Marley, M.S., Zahlne, K., Henry, G.W., Barstow, J.K., Alam, M.K., Sanz-Forcada, J., Kataria, T., Lewis, N.K., Lavvas, P., Ballester, G.E., Ben-Jaffel, L., Blumenthal, S.D., Bourrier, V., Drummond, B., García Muñoz, A., López-Morales, M., Tremblin, P., Ehrenreich, D., Wakeford, H.R., Buchhave, L.A., Lecavelier des Etangs, A., Hèbrard, G., Williamson, M.H. An Optical Transmission Spectrum for the ultra-hot Jupiter WASP-121b Measured with the Hubble Space Telescope, The Astronomical Journal, 156, 6, pp.283-317 (2018).
- 3. Bean, J.L., Stevenson, K.B., Batalha, N.M., Berta-Thompson, Z., Kriedberg, L., et al. (including Alam, M.K.) The Transiting Exoplanet Community Early Release Science Program for JWST, Publications of the Astronomical Society of the Pacific, 130, 993, pp.114402-114422 (2018).
- Bruno, G. Lewis, N.K., Stevenson, K.B., Filippazzo, J., Hill, M., Fraine, J.D., Wakeford, H.R., Deming, D., López-Morales, M., & Alam, M.K. Starspot Occultations in Infrared Transit Spectroscopy? The Case of WASP-52b, The Astronomical Journal, 156, 3, pp.124-138 (2018).
- Gizis, J.E., Dettman, K. G., Burgasser, A. J., Camnasio, S, Alam, M.K., Filippazzo, J.C., Cruz, K.L., Metchev, S., Berger, E., & Williams, P.K.G. Kepler Monitoring of an L Dwarf II. Clouds with Multiyear Lifetimes, The Astrophysical Journal, 813, 2, pp.104-114 (2015).

#### UNREFEREED MANUSCRIPTS

6. Rackham, Espinoza et al. (including Alam, M.K.) The Effect of Stellar Contamination on Space-based Transmission Spectroscopy, NASA Explanet Exploration Program SAG21 Final Report

- López-Morales, M. et al. (including Alam, M.K.) Another Servicing Mission to Extend Hubble Space Telescope's Science past the Next Decade, National Academy of Sciences Astro2020 Science White Paper (2019).
- 4. López-Morales, M. et al. (including Alam, M.K.) Detecting Earth-like Biosignatures on Rocky Exoplanets around Nearby Stars with Ground-based Extremely Large Telescopes, National Academy of Sciences Astro2020 Science White Paper (2019).
- 3. Plavchan, P. et al. (including Alam, M.K.) "Exoplanet Science Strategy" and "Astrobiology Strategy for the Search for Life in the Universe", National Academy of Sciences Astro2020 Science White Paper (2019).
- 2. Fortney, J.J., et al. (including Alam, M.K.) The Need for Laboratory Measurements and Ab Initio Studies to Aid Understanding of Exoplanetary Atmospheres, National Academy of Sciences Astro2020 Science White Paper (2019).
- 1. **Alam, M.K.**, et al. *Photometric and Spectral Analysis of Blue and Red L Dwarfs*, Cool Stars 18 Conference Proceedings (2014).