Marcel Neeleman

Königstuhl 17 – D-69117 Heidelberg – Germany
+49 (0)151 40027444 • neeleman@mpia.de
mneeleman.github.io

Scientific Interests

⋆ galaxy evolution ⋆ galaxy dynamics and gas accretion ⋆ physical conditions of the interstellar medium ⋆ quasar absorption line systems ⋆ high redshift quasars

Education

University of California, San Diego — **San Diego, USA**
Ph.D. Physics, The Physical Conditions of Atomic Gas at High Redshift — *2009–2015*
advisors: Dr. A. M. Wolfe & Dr. A. L. Coil

University of California, Santa Barbara — **Santa Barbara, USA**
B.S. Physics and Mathematics — *2003–2006*
Minor in Astronomy and Planetary Science

Research Experience

Max-Planck-Institut für Astronomie — **Heidelberg, Germany**
Postdoctoral Researcher — *2018–Present*
advisor: Dr. F. Walter; Studying the dynamics of high redshift galaxies

University of California, Santa Cruz — **Santa Cruz, USA**
Postdoctoral Researcher — *2015–2018*
advisor: Dr. J. X. Prochaska; Connecting absorption systems with high redshift galaxies

University of California, San Diego — **San Diego, USA**
Graduate Student Researcher — *2009–2015*
advisor: Dr. A. M. Wolfe; Probing the physical conditions of high redshift neutral gas

University of California, Santa Barbara — **Santa Barbara, USA**
Undergraduate Student Researcher — *2005–2006*
advisor: Dr. P. M. Lubin; Cosmology and Instrumentation

Teaching Experience

University of California, Santa Cruz — **Santa Cruz, USA**
Adjunct Faculty — *2016*
Ast230 - Graduate Course: Diffuse Matter in Space

San Diego Mesa College — **San Diego, USA**
Adjunct Faculty — *2014*
Ast101 - Undergraduate Course: Descriptive Astronomy

University of California, San Diego — **San Diego, USA**
Teaching Assistant — *2009–2011*
Phys 1L AB, Phys 2L AB - Undergraduate Physics Labs

Awards and Grants

2017 HST-GO Cycle 25 (15410): Grant awarded as part of successful HST proposal – $35,019
2014 ALMA Cycle 2 Award (SOSPA2-002): NRAO student observing support award – $33,030
2009 Regents' Fellowship: Fellowship awarded to promising first-year graduate students – $10,000
2006 Honors Award: Awarded to students graduating in the top 5 percent

Successful Telescope Proposals and Observing Experience

I have been awarded over 1000 hours of competitive time on major observatories, of these over 160 hours were on research programs for which I am the PI.

◦ **ALMA:** Band 3 - 9	183 hours	as PI: 63 hours
◦ **VLA:** K - Q Band	110 hours	as PI: 10 hours
◦ **NOEMA:** Band 1 - 3	134 hours	as PI: 42 hours
◦ **HST:** WFC3	16 orbits	as PI: 4 orbits
◦ **VLT:** X-Shooter	178 hours	
◦ **Keck:** HIRES, ESI, LRIS	25 nights	
◦ **Magellan**: FIRE, MagE, FourStar	5 nights	
◦ **Palomar:** TripleSpec	5 nights	
◦ **Shane**: Kast	8 nights	as PI: 5 nights

Below are a selection of successful proposals for which I am the PI:

HST Cycle 25 (15410): The Nature of the Host Galaxies of Damped Lyman-α Absorbers at $z \sim 4$
ALMA Cycle 7 (2019.1.01633.S): Dynamical Mass Estimates for $z > 6$ Quasar Host Galaxies
ALMA Cycle 5 (2017.1.01052.S): Mapping the Interstellar Medium of HI-Rich Galaxies at z 4
ALMA Cycle 4 (2016.1.00569.S): Characterizing Absorption-Selected High-z Galaxies (CASH)
ALMA Cycle 3 (2015.1.01564.S): [CII] Emission from Absorption-Selected Galaxies at $z \sim 4$
ALMA Cycle 2 (2013.1.00562.S): [CII] Emission from HI-Selected Galaxies
VLA Semester 2017A (17A–279): Molecular Gas in an Absorption-Selected Galaxy at $z = 4.258$
NOEMA Semester 2019W (W19DS): Exploring a Small Angular Separation QSO/SMG Pair
NOEMA Semester 2018S (S18CK): CO Emission from the Hosts of Dusty Absorbers
NOEMA Semester 2018S (S18CE): Connecting Damped Lyman-α Systems and Galaxies
NOEMA Semester 2017W (W17DG): Detecting the Host Galaxies of Damped Lyman-α Systems
Lick/Shane 3 m Semester 2010W: HI Column Density Measurements of Metal-Rich Absorbers.

Publicly Available Software Packages

QubeFit **https://github.com/mneeleman/qubefit**
Python-based code to fit the kinematics of a galaxy within a Bayesian framework.

JWSTtools **https://github.com/mneeleman/JWSTtools**
Python-based tools designed to help prepare James Webb Space Telescope proposals

Professional Activities

- **Referee:** Nature, Nature Astronomy, Astrophysical Journal, Monthly Notices of the Royal Astronomical Society, Astronomical Journal
- **Telescope Allocation Committee:** ALMA

Selected Talks

RAS Specialty Meeting — **London, England**
ALMA's High Resolution View of $z > 6$ Quasar Host Galaxies — *February 2021*

Astrolunch talk at ASTRON — **Dwingeloo, The Netherlands**
The Wolfe Disk — *December 2020*

UZH Seminar — **Zurich, Switzerland**
Observing Galaxies that Dominate the Cosmic Gas Reservoir — *October 2019*

Workshop: Nine Billion Years of Neutral Gas Evolution — **Garching, Germany**
The Molecular Gas Content of Cosmic HI Reservoirs — *July 2019*

Königstuhl Colloquium — **Heidelberg, Germany**
Observing HI at High Redshifts — *March 2019*

MIAPP Workshop — **Garching, Germany**
Connecting High-z Absorbers with Galaxies — *April 2018*

Wolfe Symposium — **Big Sur, USA**
Using Damped Lyman-α Systems to Locate Galaxies at $z \sim 4$ — *March 2018*

EWASS — **Prague, Czech Republic**
ALMA's View of Damped Lyman-α Absorbers — *June 2017*

STScI Spring Symposium — **Baltimore, USA**
Observing the Metal-Enriched CGM at $z \sim 2$ — *April 2017*

Half a Decade of ALMA — **Indian Wells, USA**
Lighting up Shadows: CO and [C II] from Absorption-Selected Galaxies — *August 2016*

IMPS Seminar — **Santa Cruz, CA**
Using ALMA and Keck to study the CGM of High-z Galaxies — *September 2015*

Dark Lunchtalk — **Copenhagen, Denmark**
Using DLAs to Study the Physical Conditions of Gas in High-z Galaxies — *June 2014*

Higgs workshop on the IGM — **Edinburgh, Scotland**
The Fundamental Plane of Damped Lyman-α Systems — *June 2013*

References

Name	Institute	Email
Prof. J. X. Prochaska	University of California, Santa Cruz	xavier@ucolick.org
Dr. F. Walter	Max-Planck-Institut für Astronomie	walter@mpia.de
Prof. N. Kanekar	National Centre for Radio Astronomy	nkanekar@ncra.tifr.res.in
Dr. C. Carilli	National Radio Astronomy Observatory	ccarilli@nrao.edu

Key Refereed Publications

Neeleman, M., Prochaska, J. X., Kanekar, N., & Rafelski, M. 2020, **Nature**, 581, 269. *A cold, massive, rotating disk galaxy 1.5 billion years after the Big Bang*

Neeleman, M., Kanekar, N., Prochaska, J. X., Rafelski, M., Carilli, C. L., & Wolfe, A. M. 2017, **Science**, 355, 1285. *[C II] 158-μm emission from the host galaxies of damped Lyman-alpha systems*

These articles describe the first-ever observations of galaxies associated with absorption systems at $z \sim 4$. They show that ALMA can detect and map the ionized carbon emission from normal galaxies at high redshift, which is one of the key science goals of ALMA. **These successful observations have opened a new area of research**; using (sub-)millimeter and radio observations to detect and study the galaxies associated with absorption systems. Both papers were accompanied by press releases from the National Radio Astronomy Observatory (NRAO), and articles for the general public were published in over 50 newspapers worldwide, including the New York Times, CBSNews, and The London Times. Here are links to the NRAO press releases: **2017** and **2020**.

Additional First Author Refereed Publications

Neeleman, M., Novak, M., Venemans, B. P., Walter, F., Decarli, R., Kaasinen, M., Schindler, J.-T., Bañados, E., Carilli, C. L., Drake, A. B., Fan, X., & Rix, H.-W. 2021, **ApJ**, 911, 141. *The Kinematics of $z \gtrsim 6$ Quasar Host Galaxies*

Neeleman, M., Bañados, E., Walter, F., Decarli, R., Venemans, B. P., Carilli, C. L., Fan, X., Farina, E. P., Mazzucchelli, C., Novak, M., Riechers, D. A., Rix, H.-W., & Wang, R. 2019b, **ApJ**, 882, 10. *Resolved [C II] Emission from $z > 6$ Quasar Host-Companion Galaxy Pairs*

Neeleman, M., Kanekar, N., Prochaska, J. X., Rafelski, M. A., & Carilli, C. L. 2019a, **ApJL**, 870, L19. *[C II] 158-μm Emission from $z \sim 4$ H I Absorption-selected Galaxies*

Neeleman, M., Kanekar, N., Prochaska, J. X., Christensen, L., Dessauges-Zavadsky, M., Fynbo, J. P. U., Møller, P., & Zwaan, M. A. 2018, **ApJL**, 856, L12. *Molecular Emission from a Galaxy Associated with a $z \sim 2.2$ Damped Lyman-α Absorber*

Neeleman, M., Prochaska, J. X., Zwaan, M. A., Kanekar, N., Christensen, L., Dessauges-Zavadsky, M., Fynbo, J. P. U., van Kampen, E., Møller, P., & Zafar, T. 2016b, **ApJL**, 820, L39. *First Connection between Cold Gas in Emission and Absorption: CO Emission from a Galaxy-Quasar Pair*

Neeleman, M., Prochaska, J. X., Ribaudo, J., Lehner, N., Howk, J. C., Rafelski, M., & Kanekar, N. 2016a, **ApJ**, 818, 113. *The H I Content of the Universe Over the Past 10 Gyrs*

Neeleman, M., Prochaska, J. X., & Wolfe, A. M. 2015, **ApJ**, 800, 7. *Probing the Physical Conditions of Atomic Gas at High Redshift*

Neeleman, M. 2015, PhD thesis, University of California, San Diego

Neeleman, M., Wolfe, A. M., Prochaska, J. X., & Rafelski, M. 2013, **ApJ**, 769, 54. *The Fundamental Plane of Damped Lyman-α Systems*

Other Refereed Publications

Bañados, E., Novak, M., **Neeleman, M.**, Walter, F., Decarli, R., Venemans, B. P., Mazzucchelli, C., Carilli, C., Wang, F., Fan, X., Farina, E. P., & Rix, H.-W. 2019, **ApJL**, 881, L23. *The $z = 7.54$ Quasar ULAS J1342+0928 Is Hosted by a Galaxy Merger*

Becker, G. D., Pettini, M., Rafelski, M., D'Odorico, V., Boera, E., Christensen, L., Cupani, G., Ellison, S. L., Farina, E. P., Fumagalli, M., López, S., **Neeleman, M.**, Ryan-Weber, E. V., & Worseck, G. 2019, **ApJ**, 883, 163. *The Evolution of O I over $3.2 < z < 6.5$: Reionization of the Circumgalactic Medium*

Berg, T. A. M., **Neeleman, M.**, Prochaska, J. X., Ellison, S. L., & Wolfe, A. M. 2015, **PASP**, 127, 167. *The Most Metal-rich Damped Lyα Systems at $z \gtrsim 1.5$ I: The Data*

Bird, S., Haehnelt, M., **Neeleman, M.**, Genel, S., Vogelsberger, M., & Hernquist, L. 2015, **MNRAS**, 447, 1834. *Reproducing the kinematics of damped Lyman-α systems*

Chittidi, J. S., Simha, S., Mannings, A., Prochaska, J. X., Rafelski, M., **Neeleman, M.**, Macquart, J.-P., Tejos, N., Jorgenson, R. A., Ryder, S. D., Day, C. K., Marnoch, L., Bhandari, S., Deller, A. T., Qiu, H., Bannister, K. W., Shannon, R. M., & Heintz, K. E. 2020, arXiv e-prints, arXiv:2005.13158. *Dissecting the Local Environment of FRB 190608 in the Spiral Arm of its Host Galaxy*

Connor, T., Bañados, E., Mazzucchelli, C., Stern, D., Decarli, R., Fan, X., Farina, E. P., Lusso, E., **Neeleman, M.**, & Walter, F. 2020, **ApJ**, 900, 189. *X-Ray Observations of a [C II]-bright, $z = 6.59$ Quasar/Companion System*

de Blok, W. J. G., Walter, F., Ferguson, A. M. N., Bernard, E. J., van der Hulst, J. M., **Neeleman, M.**, Leroy, A. K., Ott, J., Zschaechner, L. K., Zwaan, M. A., Yun, M. S., Langston, G., & Keating, K. M. 2018, **ApJ**, 865, 26. *A High-resolution Mosaic of the Neutral Hydrogen in the M81 Triplet*

Decarli, R., Dotti, M., Bañados, E., Farina, E. P., Walter, F., Carilli, C., Fan, X., Mazzucchelli, C., **Neeleman, M.**, Novak, M., Riechers, D., Strauss, M. A., Venemans, B. P., Yang, Y., & Wang, R. 2019, **ApJ**, 880, 157. *ALMA and HST Kiloparsec-scale Imaging of a Quasar-galaxy Merger at $Z \approx 6.2$*

Decarli, R., Aravena, M., Boogaard, L., Carilli, C., González-López, J., Walter, F., Cortes, P. C., Cox, P., da Cunha, E., Daddi, E., Díaz-Santos, T., Hodge, J. A., Inami, H., **Neeleman, M.**, Novak, M., Oesch, P., Popping, G., Riechers, D., Smail, I., Uzgil, B., van der Werf, P., Wagg, J., & Weiss, A. 2020, **ApJ**, 902, 110. *The ALMA Spectroscopic Survey in the Hubble Ultra Deep Field: Multiband Constraints on Line-luminosity Functions and the Cosmic Density of Molecular Gas*

Drake, A. B., Farina, E. P., **Neeleman, M.**, Walter, F., Venemans, B., Banados, E., Mazzucchelli, C., & Decarli, R. 2019, **ApJ**, 881, 131. *Lyman-α Halos around $z \sim 6$ Quasars*

Drake, A. B., Walter, F., Novak, M., Farina, E. P., **Neeleman, M.**, Riechers, D., Carilli, C., Decarli, R., Mazzucchelli, C., & Onoue, M. 2020, **ApJ**, 902, 37. *The Ionized- and Cool-gas Content of the BR1202-0725 System as Seen by MUSE and ALMA*

Farina, E. P., Arrigoni-Battaia, F., Costa, T., Walter, F., Hennawi, J. F., Drake, A. B., Decarli, R., Gutcke, T. A., Mazzucchelli, C., **Neeleman, M.**, Georgiev, I., Eilers, A.-C., Davies, F. B., Bañados, E., Fan, X., Onoue, M., Schindler, J.-T., Venemans, B. P., Wang, F., Yang, J., Rabien, S., & Busoni, L. 2019, **ApJ**, 887, 196. *The REQUIEM Survey. I. A Search for Extended Lyman-α Nebular Emission Around 31 $z > 5.7$ Quasars*

Fynbo, J. P. U., Heintz, K. E., **Neeleman, M.**, Christensen, L., Dessauges-Zavadsky, M., Kanekar, N., Møller, P., Prochaska, J. X., Rhodin, N. H. P., & Zwaan, M. 2018, **MNRAS**, 479, 2126. *ALMA observations of a metal-rich damped Lyman-α absorber at $z = 2.5832$: evidence for strong galactic winds in a galaxy group*

Jones, G. C., Carilli, C. L., Shao, Y., Wang, R., Capak, P. L., Pavesi, R., Riechers, D. A., Karim, A., **Neeleman, M.**, & Walter, F. 2017, **ApJ**, 850, 180. *Dynamical Characterization of Galaxies at $z \sim$ 4-6 via Tilted Ring Fitting to ALMA [C II] Observations*

Kaasinen, M., Walter, F., Novak, M., **Neeleman, M.**, Smail, I., Boogaard, L., Cunha, E. d., Weiss, A., Liu, D., Decarli, R., Popping, G., Diaz-Santos, T., Cortés, P., Aravena, M., Werf, P. v. d., Riechers, D., Inami, H., Hodge, J. A., Rix, H.-W., & Cox, P. 2020, **ApJ**, 899, 37. *A Comparison of the Stellar, CO, and Dust-continuum Emission from Three Star-forming HUDF Galaxies at $z \sim 2$*

Kanekar, N., **Neeleman, M.**, Prochaska, J. X., & Ghosh, T. 2018a, **MNRAS**, 473, L54. *The gas and stellar mass of low-redshift damped Lyman-α absorbers*

Kanekar, N., Prochaska, J. X., **Neeleman, M.**, Christensen, L., Møller, P., Zwaan, M. A., Fynbo, J. P. U., & Dessauges-Zavadsky, M. 2020, **ApJL**, 901, L5. *High Molecular Gas Masses in Absorption-selected Galaxies at $z \sim 2$*

Kanekar, N., Prochaska, J. X., Christensen, L., Rhodin, N. H. P., **Neeleman, M.**, Zwaan, M. A., Møller, P., Dessauges-Zavadsky, M., Fynbo, J. P. U., & Zafar, T. 2018b, **ApJL**, 856, L23. *Massive, Absorption-selected Galaxies at Intermediate Redshifts*

Lusso, E., Fumagalli, M., Rafelski, M., **Neeleman, M.**, Prochaska, J. X., Hennawi, J. F., O'Meara, J. M., & Theuns, T. 2018, **ApJ**, 860, 41. *The Spectral and Environment Properties of $z \sim$ 2.0-2.5 Quasar Pairs*

Mazzucchelli, C., Decarli, R., Farina, E. P., Bañados, E., Venemans, B. P., Strauss, M. A., Walter, F., **Neeleman, M.**, Bertoldi, F., Fan, X., Riechers, D., Rix, H. W., & Wang, R. 2019, **ApJ**, 881, 163. *Spectral Energy Distributions of Companion Galaxies to $z \sim 6$ Quasars*

Møller, P., Christensen, L., Zwaan, M. A., Kanekar, N., Prochaska, J. X., Rhodin, N. H. P., Dessauges-Zavadsky, M., Fynbo, J. P. U., **Neeleman, M.**, & Zafar, T. 2018, **MNRAS**, 474, 4039. *ALMA + VLT observations of a damped Lyman-α absorbing galaxy: massive, wide CO emission, gas-rich but with very low SFR*

Novak, M., Bañados, E., Decarli, R., Walter, F., Venemans, B., **Neeleman, M.**, Farina, E. P., Mazzucchelli, C., Carilli, C., Fan, X., Rix, H., & Wang, F. 2019, **ApJ**, 881, 63. *An ALMA Multiline Survey of the Interstellar Medium of the Redshift 7.5 Quasar Host Galaxy J1342+0928*

Novak, M., Venemans, B. P., Walter, F., **Neeleman, M.**, Kaasinen, M., Liang, L., Feldmann, R., Banados, E., Carilli, C., Decarli, R., Drake, A. B., Fan, X., Farina, E. P., Mazzucchelli, C., Rix,

H.-W., & Wang, R. 2020, **ApJ**, 904, 131. *No evidence for [C II] halos or high-velocity outflows in z>6 quasar host galaxies*

Pei, L., Barth, A. J., Aldering, G. S., Briley, M. M., Carroll, C. J., Carson, D. J., Cenko, S. B., Clubb, K. I., Cohen, D. P., Cucchiara, A., Desjardins, T. D., Edelson, R., Fang, J. J., Fedrow, J. M., Filippenko, A. V., Fox, O. D., Furniss, A., Gates, E. L., Gregg, M., Gustafson, S., Horst, J. C., Joner, M. D., Kelly, P. L., Lacy, M., Laney, C. D., Leonard, D. C., Li, W., Malkan, M. A., Margon, B., **Neeleman, M.**, Nguyen, M. L., Prochaska, J. X., Ross, N. R., Sand, D. J., Searcy, K. J., Shivvers, I. S., Silverman, J. M., Smith, G. H., Suzuki, N., Smith, K. L., Tytler, D., Werk, J. K., & Worseck, G. 2014, **ApJ**, 795, 38. *Reverberation Mapping of the KEPLER Field AGN KA1858+4850*

Prochaska, J. X., & **Neeleman, M.** 2018, **MNRAS**, 474, 318. *The astrophysical consequences of intervening galaxy gas on fast radio bursts*

Prochaska, J. X., **Neeleman, M.**, Kanekar, N., & Rafelski, M. 2019, **ApJL**, 886, L35. *ALMA [C II] 158-μm Imaging of an H I-selected Major Merger at z $\sim$ 4*

Rafelski, M., Gardner, J. P., Fumagalli, M., **Neeleman, M.**, Teplitz, H. I., Grogin, N., Koekemoer, A. M., & Scarlata, C. 2016, **ApJ**, 825, 87. *The Star Formation Rate Efficiency of Neutral Atomic-dominated Hydrogen Gas in the Outskirts of Star-forming Galaxies from z $\sim$ 1 to z $\sim$ 3*

Rafelski, M., **Neeleman, M.**, Fumagalli, M., Wolfe, A. M., & Prochaska, J. X. 2014, **ApJL**, 782, L29. *The Rapid Decline in Metallicity of Damped Lyman-α Systems at z $\sim$ 5*

Rafelski, M., Wolfe, A. M., Prochaska, J. X., **Neeleman, M.**, & Mendez, A. J. 2012, **ApJ**, 755, 89. *Metallicity Evolution of Damped Lyman-α Systems Out to z $\sim$ 5*

Taufik Andika, I., Jahnke, K., Onoue, M., Bañados, E., Mazzucchelli, C., Novak, M., Eilers, A.-C., Venemans, B. P., Schindler, J.-T., Walter, F., **Neeleman, M.**, Simcoe, R. A., Decarli, R., Farina, E. P., Marian, V., Pensabene, A., Cooper, T. M., & Rojas, A. F. 2020, **ApJ**, 903, 34. *Probing the Nature of High Redshift Weak Emission Line Quasars: A Young Quasar with a Starburst Host Galaxy*

Venemans, B., Walter, F., **Neeleman, M.**, Novak, M., Otter, J., Decarli, R., Bañados, E., Drake, A., Farina, E., Kaasinen, M., Mazzucchelli, C., Carilli, C., Fan, X., Rix, H.-W., & Wang, R. 2020, **ApJ**, 904, 130. *Kiloparsec-scale ALMA Imaging of [C II] and Dust-continuum Emission of 27 Quasar Host Galaxies at z $\sim$ 6*

Venemans, B. P., **Neeleman, M.**, Walter, F., Novak, M., Decarli, R., Hennawi, J. F., & Rix, H.-W. 2019, **ApJL**, 874, L30. *400 pc Imaging of a Massive Quasar Host Galaxy at a Redshift of 6.6*

Walter, F., Riechers, D., Novak, M., Decarli, R., Ferkinhoff, C., Venemans, B., Bañados, E., Bertoldi, F., Carilli, C., Fan, X., Farina, E., Mazzucchelli, C., **Neeleman, M.**, Rix, H.-W., Strauss, M. A., Uzgil, B., & Wang, R. 2018, **ApJL**, 869, L22. *No Evidence for Enhanced [O III] 88-μm Emission in a $z \sim 6$ Quasar Compared to Its Companion Starbursting Galaxy*

Walter, F., Carilli, C., **Neeleman, M.**, Decarli, R., Popping, G., Somerville, R. S., Aravena, M., Bertoldi, F., Boogaard, L., Cox, P., da Cunha, E., Magnelli, B., Obreschkow, D., Riechers, D., Rix, H.-W., Smail, I., Weiss, A., Assef, R. J., Bauer, F., Bouwens, R., Contini, T., Cortes, P. C., Daddi, E., Diaz-Santos, T., González-López, J., Hennawi, J., Hodge, J. A., Inami, H., Ivison, R., Oesch, P., Sargent, M., van der Werf, P., Wagg, J., & Yung, L. Y. A. 2020, **ApJ**, 902, 111. *The Evolution of the Baryons Associated with Galaxies Averaged over Cosmic Time and Space*