HILKE ELISABETH SCHLICHTING

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Degrees:

Ph.D., Astrophysics, California Institute of Technology, 2009
Master of Science, Astrophysics, California Institute of Technology, 2007
Master of Arts, University of Cambridge, 2007
Master of Natural Sciences, Theoretical Physics, University of Cambridge, 2004
Bachelor of Arts, Physics, University of Cambridge, 2004

Employment:

Associate Dean for Research, Division of Physical Sciences, UCLA, 2022-Current
Professor, Earth, Planetary and Space Sciences, UCLA, 2021-Current
Visiting Professor, EAPS, Massachusetts Institute of Technology, 2017-2021
Associate Professor, Physics & Astronomy, UCLA, 2016-2021
Associate Professor, Earth, Planetary and Space Sciences, UCLA, 2015-2021
Assistant Professor, Physics, Massachusetts Institute of Technology, 2015-2017
Assistant Professor, EAPS, Massachusetts Institute of Technology, 2013-2017
NASA Hubble Postdoctoral Fellow, University of California, Los Angeles, 2010-2013
Postdoctoral Fellow, Canadian Institute for Theoretical Astrophysics, 2009-2010

Honors & Awards:

- Visiting Fellow Commoner, Trinity College, University of Cambridge, UK, 2022
- Scialog: Signatures of Life in the Universe Fellow, Research Cooperation for the Advancement of Science, 2020
- Kavli visitor in Astrophysics (medium term), University of Cambridge, UK, 2019-2022
- Kavli visitor in Astrophysics (short term), University of Cambridge, UK, 2018
- Kavli Frontiers of Science Fellow, U.S. National Academy of Sciences, 2015
- Asteroid (9522) Schlichting, named 2014
- Elected Member of Elisabeth-Schiemann-Kolleg, Max Planck Society, 2014
- Chancellor's Award for Exceptional Accomplishments in Postdoctoral Research, University of California, Los Angeles, 2012
- Hubble Fellowship, NASA, 2010
- Best Poster Prize, WE-Heraeus Physics School on "The Early Phase of Planet Formation", 2008
- Reed-Fellowship, California Institute of Technology, 2004
- New Hall Scholarship, University of Cambridge, 2004
- Fellow of the Cambridge European Society, Cambridge European Trust, 2004
- Studienstiftung des deutschen Volkes, 2003
- European Trust Bursary, Cambridge European Trust, 2001

Ph.D. & Masters Students:

Miesener, William, UCLA, Fall 2018 - Current
Gupta, Akash, UCLA, Fall 2017- Current
Trierweiler, Isabella, UCLA, Fall 2018 – Current (co-advisor)
Biersteker, John, MIT, Fall 2014 – Summer 2019, PhD, August 2019
Inamdar, Niraj, MIT, Spring 2014- Summer 2016, PhD August 2016
Gonzales, Alexandria, MIT, Fall 2014-2016 (Masters project)

PhD Thesis Committee: Julian de Witt (MIT, 2014), Roger Fu (MIT, 2015), Niraj Inamdar (MIT, 2016), John Biersteker (MIT, 2019), Lior Rubanenko (UCLA, 2020), Alexander Stephan (UCLA, 2020), Matthew Heising (2021, Harvard), Diana Powell (2021, UCSC), Jonathan Zink (UCLA, 2021), Alexandra Doyle (UCLA, 2021), Kevin Hayakawa (UCLA, 2022)

Undergraduate Students:

Carrillo, Israel, UCLA, 2022-Current
Narasimhan, Manasa, UCLA, 2021-2022
Esquival, Emma, UCLA, 2020 - 2021
Nicholson, Lorraine, UCLA, 2020-2022 (now Ph.D. student, University of Florida)
Eshbaugh, Emilie, UCLA, 2019 - 2020
Heising, Matthew, MIT, 2013 - 2014 (Ph.D., Harvard University 2021)
Kulchoakrungsun, Ekapob, MIT, 2013-2015 (now Ph.D. student, NYU)
Romero, Robert, MIT, 2014

Postdocs/Research Scientists:

Rogers, James, UCLA, 2022-Current
James Owen, UCLA, 2022
Pan, Margaret, MIT, 2015-2018

Teaching:

UCLA: EPSS 9, Solar Systems and Planets, 2017, 2018, 2019, 2021, level: large undergraduate general education class

EPSS M140/AOS M120, Introduction to Fluid Dynamics, level: upper division undergraduate

EPSS 155, Planetary Physics, 2020, 2022, level: upper division undergraduate

EPSS 219, Planetary and Orbital Dynamics, 2017, 2019, 2021, level: graduate

EPSS 200E, Planetary Origins and Evolution, 2018, 2020, 2021, level: graduate

EPSS 19, Fiat lux, level: UCLA Centennial Initiative: Life and Work of Five Female UCLA Scientists, Spring 2018, level: undergraduate

MIT: 12.425/12.625/8.926J, Extrasolar Planets, Physics & Detection Techniques, Spring 2014, Spring 2015, Spring 2016, level: undergraduate & graduate

12.098/12.S680, The Formation & Evolution of Planetary Systems, Fall 2014, level: undergraduate & graduate

Summer/Winter Schools:

CIDER, 2022, UC Berkeley, Berkeley, CA

Lecturer Planet Formation Summer School, 2015, Niels Bohr Institute, Copenhagen, Denmark
Lecturer Winter Workshop on Planetary Astrophysics, 2009, Kavli Institute for Astronomy & Astrophysics, Peking University, China

Public Lectures:

NASA's Universe of Learning, science briefing, *Understanding the origin and diversity of planets*, 2018
Melon conference talk, Hong Kong, 2018
Aspen: physics café speaker, 2017
UCLA Meteorite Gallery, University of California, Los Angeles, 2016
Observing Night, Wellesley College, 2015,
Astronomy Society, Santa Barbara City College, 2015
Astronomy & Space Exploration Society, University of Toronto, 2010

University Service:

Associate Dean for Research, Division of Physical Sciences, UCLA, 2022-Current
Chair UCLA Pegasus 51 b fellowship committee, 2019-2020, 2021-2022
UCLA Division of Physical sciences: co-organizer women leadership workshop, 2018, 2020
UCLA Division of Physical sciences: host of faculty lunch seminars Winter & Spring 2018
UCLA EPSS representative to the legislative assembly, 2017-2020
UCLA EPSS Faculty Search Committee, 2016/2017, 2021/2022
UCLA EPSS Diversity Committee, 2016/2017
MIT EAPS Graduate Student Admissions Committee, 2013/2014, 2014/2015
MIT EAPS Department Lecture Series Committee 2014/2015
MIT EAPS Faculty Search Committee, 2013/2014
MIT Ivy Plus Symposium, Speaker, 2014
EAPS Undergraduate Advisor, 2014/2015

External Service:

Referee for Nature, Nature Astronomy, Astrophysical Journal, Astrophysical Journal Letters, Astronomical Journal, Icarus, MNRAS, Space Science Reviews, JGR Planets, Astronomy & Astrophysics
NASA Review Panel
NSF Review Panel
Hubble Fellow Selection Committee, 2014, 2020
Reviewer for The Israel Science Foundation, 2013
Reviewer for The French Research Agency, 2012
Hubble Space Telescope Time Allocation Committee, 2011, 2015
Scientific Organizing Committee:

- Transformative Astrophysics with WFIRST meeting, Pasadena (2016)
- 4th Session of the Sant Cugat Forum on Astrophysics, Spain (2016)
- Formation and Dynamical Evolution of Exoplanets meeting, Aspen (2017)
- Stars, Planets & Galaxies meeting, Berlin, Germany (2018)
- Exoplanets II meeting, Cambridge, UK (2018)
- Planet Formation: From dust coagulation to final orbit assembly, Munich, Germany (2020)

NASA NExSS Steering Committee, 2018-current

Talks and Colloquia (last 6 years):

2022

- Astronomy Colloquium, Princeton University, *The Atmosphere-Interior connection of super Earths & sub-Neptunes: From Formation and Evolution to Observations*
- Astronomy Colloquium, UCSC, *The Atmosphere-Interior connection of super Earths & sub-Neptunes: From Formation and Evolution to Observations*
- Invited talk, JPL, ExoSS
- ESS Colloquium, Harvard University, *Rocky Planet Formation with primordial H_2-rich Atmospheres: Implications for Super-Earths, Sub-Neptunes and Earth*
- Astronomy Colloquium, UCLA, *Rocky Planet Formation with primordial H_2-rich Atmospheres: Implications for Super-Earths, Sub-Neptunes and Earth*
- Astronomy Seminar, Imperial College London, *Rocky Planet Formation with primordial H_2-rich Atmospheres: Implications for Super-Earths, Sub-Neptunes and Earth*
- Contributed talk, Exoplanets in our backyard conference, Albuquerque, NM

2021

- Invited plenary speaker, DPS
- Rochester Astronomy Colloquium, *The Atmosphere-Interior connection of super Earths & sub-Neptunes*
- Princeton University Exoplanet Seminar, *The Atmosphere-Interior connection of super Earths & sub-Neptunes*

2020

- Exoplanet Seminar, University of Cambridge*, Losing Oceans: Atmospheric loss by giant impacts revisited,* Cambridge, UK
- EAPS Colloquium, MIT, *Metamorphosis: Turning (sub-)Neptunes into (super-)Earths*, Cambridge, MA, USA
- EPSS Colloquium, *Losing Oceans: Atmospheric loss by giant impacts revisited*, UCLA, CA, USA
- Invited speaker, Exoplanet III conference, Heidelberg, Germany

2019

- Invited speaker, International Conference on Astrophysical Dynamics, Shanghai, China
- Invited speaker, StarPlanet2019, Ringberg, Germany
- Invited speaker, Lorentz Center Workshop on Exocomets, Leiden, Netherlands
- Colloquium, Leiden Observatory, *Atmospheric accretion and loss during planet formation*
- Invited speaker, Theoretical and Computational Challenges in Planet formation, Flatiron Institute, NYC, NY, USA
- Colloquium, University of Washington, *Atmospheric accretion, evolution and loss of super-Earths, sub-Neptunes and terrestrial planets,* Seattle, WA, USA
- Contributed talk, Kepler & k2 Science Conference, Glendale, CA, USA
- Invited speaker, Math + X Symposium, Rice University, Houston, TX, USA
- Planetray Science Seminar, Caltech*, Atmospheric accretion, evolution and loss of super-Earths and sub-Neptunes*, Pasadena, CA, USA
- Contributed talk, Exoclimes Conference, Oxford, UK

2018

- Plenary speaker, Conference for Undergraduate Women in Physics, Pomona
- Contributed talk, Stars, Planets & Galaxies meeting, Berlin, Germany
- Invited Speaker, Best of UCLA in Mexico Symposium, Mexico City, Mexico
- Colloquium, Canadian Institute for Theoretical Astrophysics, Toronto, Canada, *To Have and Not to Hold: Atmospheric accretion, evolution and loss of Super-Earths*
- Contributed talk, Exoplanets II meeting, Cambridge, UK
- Invited speaker, 27th Bay Area Exoplanet meeting, NASA Ames, Mountain View, CA, USA
- Astrophysics Seminar, *Formation & Evolution of close-in Exoplanets*, University of Cambridge, UK
- Astrophysics Colloquium, *Formation & Evolution of close-in Exoplanets*, JPL, Pasadena, CA, USA

2017

- Colloquium, Max Plank Institute for Astronomy, Heidelberg, Germany, *Planet Formation at home and abroad*
- Colloquium, ITC, CfA, Harvard University, *Formation of super-Earths*
- Colloquium, Cornell University, Planet *Formation at home and abroad*
- Planetary Science Seminar, UCSC, *Formation of super-Earths*
- Colloquium, UC Riverside, *Planet Formation at home and abroad*
- Contributed talk, Planet formation & Evolution Meeting, Jena, Germany
- Colloquium, Max Plank Institute for Astrophysics, Munich, *Formation of Super-Earths*
- Contributed talk, Formation and Dynamical Evolution of Exoplanets, Aspen
- Contributed talk, Lunar and Planetary Science Conference, Houston
- Colloquium, Lowell Observatory, Flagstaff, *Formation of Planets at home and abroad*
- Invited Speaker, Gordon conference on 'Origins of Solar Systems' Mount Holyoke College
- Invited Speaker, MIRA Conference on 'Origins of Volatiles in Rocky Worlds' University of Michigan

Press Release:

1) *Home-Made is Always Better than Delivery,* UCLA Release, scheduled for March, 2023
2) *Ancient stars shed light on Earth's similarities to other planets,* UCLA Release, October 17, 2019
3) *Using Dust Lines to Learn About Planetary Birthplaces,* AAS Nova News Release, 19th May 2017
4) *Versatile Instrument to Scout for Kuiper Belt Objects*, NASA News Release, March 3, 2016
5) *Losing Air, new study finds that a barrage of small impacts likely erased much of the Earth's primordial atmosphere,* MIT News Release, December 2, 2014
6) *Hubble Finds Smallest Kuiper Belt Object Ever Seen,* STScI News Release, December 16, 2009

Publications:

Summary: 52 peer-reviewed publications (50 published, 2 under review) 15 first author, 20 second author, 16 papers led by student authors directly supervised. Total citations: 2914, h-index: 29 (google scholar 15th Jan 2023)

Submitted Publications: (*= student/postdoc author directly supervised)

1) *Earth Shaped by Primordial H_2 Atmospheres,* Edward D. Young, Anat Shahar & **Hilke E. Schlichting**, 2023, Nature accepted
2) *Conclusive evidence for a population of water-worlds around M-dwarfs remains elusive,* J. G. Rogers, **Hilke E. Schlichting** & J. E. Owen, 2023, ApJL, submitted

Refereed Publications: (*= student/postdoc author directly supervised)

1) *The fundamentals of Lyman-α exoplanet transits*, J.E. Owen, R.A. Clay, E. Schreyer, **Hilke E. Schlichting** et al., 2023, MNRAS, 518, 4357
2) **Properties of the radius valley around low mass stars: Predictions from the core-powered mass-loss mechanism*, Akash Gupta, Lorraine Nicholson & **Hilke E. Schlichting**, 2022, MNRAS, 516, 4585
3) *The Exoplanet Radius Valley from Gas-driven Planet Migration and Breaking of Resonant Chain*, A. Izidoro, **Hilke E. Schlichting**, et al. 2022, ApJL, 939, L19
4) *AU Microscopii in the FUV: Observations in Quiescence, During Flares, and Implications for AU Mic b and c,* Feinstein et al., 2022, AJ, 164, 110
5) *Multiwavelength Vertical Structure in the AU Mic Debris Disk: Characterizing the Collisional Cascade*, Vizgan D. et al., 2022, ApJ, 935, 131
6) **The importance of silicate vapor in determining the structure, radii, and envelope mass fractions of Sub-Neptune,* William Misener & **Hilke E. Schlichting**, 2022, Volume 514, 6025
7) **Atmospheric Loss by Aerial Bursts*, Isabella Trierweiler & **Hilke E. Schlichting**, 2022, MNRAS, 514, 3650
8) *Chemical equilibrium between Cores, Mantles, and Atmospheres of Super-Earths and Sub-Neptunes, and Implications for their Compositions, Interiors and Evolution*, **Hilke E. Schlichting** & Edward D. Young, 2022, Planetary Science Journal, 3, 127
9) Photoevaporation versus core-powered mass-loss: model comparison with the 3D radius gap, J.G. Rogers, A. Gupta, J.E. Owen, **Hilke E. Schlichting**, 2021, MNRAS, 508, 5886
10) **Caught in the act: core-powered mass-loss predictions for observing atmospheric escape,* Akash Gupta & **Hilke E. Schlichting**, 2021, MNRAS, 504, 4634
11) **To cool is to keep: residual H/He atmospheres of super-Earths and sub-Neptunes*, William Misener & **Hilke E. Schlichting**, 2021, MNRAS, 503, 5658
12) **Losing Oceans: The Effects of Composition on the Thermal Component of Impact-driven Atmospheric Loss*, John B. Biersteker & **Hilke E. Schlichting**, 2021, MNRAS, 501, 587

13) *Where are the Extrasolar Mercuries?,* A. E. Doyle, B. Klein, **Hilke E. Schlichting** and E. D. Young, 2020, ApJ, 901, 10

14) **Signatures of the Core-Powered Mass-Loss Mechanism in the Exoplanet Population: Dependence on Stellar Properties and Observational Predictions,* A. Gupta & **Hilke E. Schlichting**, 2020, MNRAS, 493, 792

15) *Oxygen fugacities of extrasolar rocks: evidence for an Earth-like geochemistry of exoplanets* A. E. Doyle1, E. D. Young, B. Klein, B. Zuckerman, **Hilke E. Schlichting**, 2019, Science, 6463, 356

16) **Sculpting the Valley in the Radius Distribution of Small Exoplanets as a by-product of Planet Formation: The Core-Powered Mass-Loss Mechanism,* A. Gupta & **Hilke E. Schlichting**, 2019, MNRAS, 487, 24

17) *The Mass of Stirring Bodies in the AU Mic Debris Disk inferred from Resolved Vertical Structure*, C. Daley, A. M. Hughes, E. S. Carter, K. Flaherty, Z. Lambros, M. Pan, **Hilke E. Schlichting**, E. Chiang, M. Wyatt, D. Wilner, S. Andrews, and J. Carpenter, 2019, ApJ, 875, 87

18) **Atmospheric Mass Loss Due to Giant Impacts: The Importance of the Thermal Component for H/He Envelope,* J. B. Biersteker & **Hilke E. Schlichting**, 2019, MNRAS, 485, 4454

19) *Near-equilibrium isotope fractionation during planetesimal evaporation*, E. D. Young, A Shahar, F. Nimmo, **Hilke E. Schlichting**, E. A. Schauble, H. Tang, J. Labidi, 2019, Icarus, 323, 1

20) *New Constraints From Dust Lines on the Surface Densities of Protoplanetary Disks*, D. Powell, R. Murray-Clay, L. M. Pérez, **Hilke E. Schlichting**, and M. Rosenthal, 2019, ApJ, 878, 116

21) *Atmospheric Mass Loss from High Velocity Giant Impacts*, A. Yalinewich & **Hilke E. Schlichting**, 2019, MNRAS, 486, 2780

22) *Formation of Super-Earths,* **Hilke E. Schlichting**, 2018, Handbook of Exoplanets, Springer Reference Works, Juan Antonio Belmonte and Hans Deeg, Eds; 1-20

23) **Core-powered mass-loss and the radius distribution of small exoplanets,* Sivan Ginzburg, **Hilke E. Schlichting** & Re'em Sari, 2018, MNRAS, 476, 759

24) *Atmosphere Impact Losses***, Hilke E. Schlichting** & S. Mukhopadhyay, 2018, Space Science Reviews, Volume 214, 31

25) * *Super-Earths: Atmospheric Accretion, Thermal Evolution and Envelope Loss*, S. Ginzburg, N. Inamdar & **Hilke E. Schlichting**, 2017, Formation, Evolution, and Dynamics of Young Solar Systems, Astrophysics and Space Science Library, Volume 445, p. 295

26) **Detection of Exoplanetary oblateness using transit depth variations*, John Bierstecker & **Hilke E. Schlichting**, 2017, ApJ, 154, 164

27) *Using Ice and Dust Lines to constrain the Surface Densities of Protoplanetary Disks*, D. Powell, R. Murray-Clay & **Hilke E. Schlichting**, 2017, ApJ, 840, 93

28) ***Super-Earth Atmospheres: Self-consistent Gas Accretion and Retention*, Sivan Ginzburg, **Hilke E. Schlichting** & Re'em Sari, 2016, ApJ, 825, 29

29) ***Stealing the Gas: Giant Impacts & the Large Diversity in Exoplanet Densities,* Niraj Inamdar & **Hilke E. Schlichting**, 2016, ApJ, 817, L13

30) **A Search for Ringed Exoplanets using Kepler Photometry,* Matthew Z. Heising, Geoffrey W. Marcy & **Hilke E. Schlichting**, 2015, ApJ, 814, 81

31) *CHIMERA: A wide-field, multi-color, high-speed photometer at the prime focus of the Hale telescope*, L. K. Harding, G. Hallinan, J. Milburn, P. Gardner, N. Konidaris, N. Singh, M. Shao, J. Sandhu, G. Kyne & **Hilke E. Schlichting**, 2016, MNRAS, 457, 3036

32) **Formation of Super-Earths & Mini-Neptunes with Giant Impacts,* Niraj Inamdar & **Hilke E. Schlichting**, 2015, MNRAS, 448, 1751

33) *Atmospheric Mass Loss During Planet Formation: The importance of Planetesimal Impacts,* **Hilke E. Schlichting**, Re'em Sari & Almog Yalinewich, 2015, Icarus, 247, 81

34) *Formation of Close in Super-Earths & Mini-Neptunes: Required Disk Masses & Their Implications*, **Hilke E. Schlichting**, 2014, ApJL, 795, 15

35) *Overstable Librations can Account for the Paucity of Mean Motion Resonances among Exoplanet Pairs***,** P. Goldreich & **Hilke E. Schlichting**, 2014, AJ, 147, 32

36) *Dynamical and Collisional Constraints on a Stochastic Late Veneer on the Terrestrial planets*, Raymond, **Hilke E. Schlichting,** Hersant & Selsis 2013, Icarus, 226, 671

37) *Initial Planetesimal Sizes and the Size Distribution of Small Kuiper Belt Objects,* **Hilke E. Schlichting**, Ceser Fuentes, David Trilling 2013, AJ, 146, 36

38) *Measuring the Abundance of sub-kilometer sized Kuiper Belt Objects using Stellar Occultations*, **Hilke E. Schlichting** et al. 2012, ApJ, 761, 150

39) *The Last Stages of Terrestrial Planet Formation: Dynamical Friction and the Late Veneer,* **Hilke E. Schlichting**, P.H, Warren & Q.Z. Yin 2012, ApJ, 752, 8

40) *Self-consistent Size and Velocity Distributions of Collisional Cascades,* Margaret Pan & **Hilke E. Schlichting** *2012, ApJ, 747, 113*

41) *Warm Saturns: On the Nature of Rings of Extrasolar Planets that Reside Inside the Ice Line,* **Hilke E. Schlichting** & Philip Chang 2011, ApJ, 734, 117

42) *Runaway Growth During Planet Formation: Explaining the Size Distribution of Large Kuiper Belt Objects,* **Hilke E. Schlichting** & R. Sari 2011, ApJ, 728, 68

43) *Using Kuiper Belt Binaries to Constrain Neptune's Migration History,* Ruth A. Murray-Clay & **Hilke E. Schlichting** 2011, ApJ, 730, 132

44) *A Single sub-km Kuiper Belt object from a stellar Occultation in archival data,* **Hilke E. Schlichting**, E. O. Ofek, M. Wenz, R. Sari, A. Gal-Yam, M. Livio, E. Nelan, S. Zucker 2009, Nature, 462, 895

45) *The Creation of Haumea's Collisional Family,* **Hilke E. Schlichting** & Re'em Sari 2009, ApJ, 700, 1242

46) *The Ratio of Retrograde to Prograde Orbits: A Test for Kuiper Belt Binary Formation Theories*, **Hilke E. Schlichting** & Re'em Sari 2008, ApJ, 686, 741

47) *Formation of Kuiper Belt Binaries*, **Hilke E. Schlichting** & Re'em Sari 2008, ApJ, 673, 1218

48) *The Self-Similarity of Shear-Dominated Viscous Stirring,* Benjamin F. Collins, **Hilke E. Schlichting** & Re'em Sari 2007, AJ, 133, 2389

49) *The Effect of Semicollisional Accretion on Planetary Spins,* **Hilke E. Schlichting** & Re'em Sari 2007, ApJ, 658, 593

50) *A study of a long water detector for cosmic-ray studies***,** J. Gebauer, E. Lorenz, R. Mirzoyan, **H. E. Schlichting** and F. Steinbügl 2004, NIMA 518/1-2 pp. 198-200