

Dr. Katherine R. de Kleer

California Institute of Technology, M/C 150-21, Pasadena, CA 91125
deklee@caltech.edu
<http://w.astro.berkeley.edu/~kdekleer>

EDUCATION	Ph.D. Astrophysics , University of California, Berkeley Spring 2017 <i>Thesis:</i> “Extreme Worlds of the Outer Solar System: Dynamic Processes on Uranus & Io” <i>Advisor:</i> Prof. Imke de Pater
	M.A. Astrophysics , University of California, Berkeley Spring 2013
	B.Sc. Mathematics , Massachusetts Institute of Technology Spring 2009
	B.Sc. Physics with Astronomy Minor , Massachusetts Institute of Technology Spring 2009 <i>Thesis:</i> “Photometry and Transit-Timing Analysis for Eleven Transiting Exoplanets” <i>Advisor:</i> Prof. Joshua Winn
RESEARCH INTERESTS	Broad interests in planetary astronomy, including the interiors, surfaces, and atmospheres of planets and satellites. Recent work has focused on the composition of ice giant atmospheres and on Io’s tidally-powered volcanism, based on ground-based infrared and millimeter telescope observations. Additional interests include planetary ring systems, geophysics of satellites and extrasolar planets, and astrobiology.
RESEARCH POSITIONS	Heising-Simons Foundation 51 Pegasi b Postdoctoral Fellow , Caltech 2017-present Visting Scholar , Keck Observatory June 2017 NSF Graduate Research Fellow , UC Berkeley 2013-2017 Graduate Student Researcher , UC Berkeley 2010; 2012-2013; 2016-2017 Visiting Research Student , Montana State University, Bozeman, Montana Fall 2015; Summer 2016 Visiting Research Student , Max Planck Institute (MPE), Garching, Germany Summer 2012 Visiting Research Student , Tel Aviv University, Tel Aviv, Israel Summer & Fall 2009 Undergraduate Research Assistant (UROP Program) , MIT 2008-2009 NSF REU Research Student , NASA Ames/SETI Institute Summer 2007 Undergraduate Research Assistant (UROP Program) , MIT Spring 2007 NSF REU Research Student , MIT Haystack Observatory Summer 2006
SELECTED AWARDS & HONORS	Outstanding Student Presentation Award , JpGU-AGU Joint Meeting, Chiba, Japan 2017 The Mary Elizabeth Uhl Prize for Outstanding Scholarly Achievement , UC Berkeley 2017 Heising-Simons Foundation 51 Pegasi b Postdoctoral Fellowship 2017 NASA Postdoctoral Program (NPP) Fellowship (declined) 2017 NSF Astronomy & Astrophysics Postdoctoral Fellowship (declined) 2017 Hubble Postdoctoral Fellowship (declined) 2017 The Pierazzo International Student Travel Award , Planetary Science Institute 2017 The Robert J. Trumpler Graduate Student Excellence Award , UC Berkeley 2016 NSF Graduate Research Program Fellowship 2013 NASA Earth and Space Science Fellowship (declined) 2013 Outstanding Graduate Student Instructor , UC Berkeley 2013
PI TELESCOPE PROGRAMS	The Atacama Large Millimeter Array (ALMA) 1. K. de Kleer , I. de Pater, M. Gurwell, A. Moullet, B. Butler, R. Moreno, Cycle 4 (2016-17): 2016.1.00691.S (7.2 hours) Gemini Observatory 7. K. de Kleer & I. de Pater, Spr 2017: GN-2017A-Q-53, NIRI+ALTAIR (long-term cadence program). 6. K. de Kleer & I. de Pater, Fall 2016: GN-2016B-Q-5, NIRI+ALTAIR (20 hours; cadence program). 5. K. de Kleer & I. de Pater, Spr 2016: GN-2016A-Q-34, NIRI+ALTAIR (20 hours; cadence program). 4. K. de Kleer & I. de Pater, Spr 2016: GN-2016A-Q-33, NIRI+ALTAIR (3 hours). 3. K. de Kleer & I. de Pater, Fall 2015: GN-2015B-FT-12, NIRI+ALTAIR (3.5 hours). 2. K. de Kleer , I. de Pater, A. Davies, Spr 2014: GN-2014A-Q-34, NIRI+ALTAIR (20 hours; cadence program). 1. K. de Kleer , I. de Pater, A. Davies, Fall 2013: GN-2013B-DD-3, NIRI+ALTAIR (3 hours; cadence program). NASA Infrared Telescope Facility (IRTF)

2. **K. de Kleer**, I. de Pater, A. Davies, M. Ádámkóvics, J. Rathbun, J. Spencer, Spr 2014: 2014A032, NSFCam/CSHELL (6.7 hours over 20 nights)
1. **K. de Kleer**, I. de Pater, A. Davies, M. Ádámkóvics, Fall 2013: 2013B030, SpeX (6.7 hours over 4 nights).

Combined Array for Research in Millimeter Astronomy (CARMA)

4. **K. de Kleer**, I. de Pater, S. Luszcz-Cook, Fall 2013. A/B/C-arrays, 220 GHz (8 hours ToO).
3. **K. de Kleer**, I. de Pater, S. Luszcz-Cook, Fall 2013. B-array, 220 GHz (15 hours).
2. **K. de Kleer**, I. de Pater, S. Luszcz-Cook, Spr 2013. B-array, 220 GHz (15 hours Director's Time).
1. **K. de Kleer**, I. de Pater, S. Luszcz-Cook, Spr 2013. C-array, 220 GHz (28 hours).

Lick Observatory

2. **K. de Kleer**, I. de Pater, J. Tollefson, M. Wong, S. Luszcz-Cook, E. Gates, D. Gavel, Fall 2016. 2016B_S002, ShARCs/ShaneAO (cadence program).
1. **K. de Kleer** & I. de Pater, Fall 2015: 2015B_S015, ShARCs/ShaneAO (4 hours over 4 nights).

SELECTED CO-I TELESCOPE PROGRAMS

Hubble Space Telescope

2. I. de Pater et al., Cycle 22: GO14045, WFC3/UVIS (2 orbits)
1. M. Wong et al., Cycle 23: GO14492, WFC3/UVIS (4 orbits)

Keck Observatory

- * 10+ programs in 2010-2016 (P.I.'s: I. de Pater, A. Davies), NIRC2, NIRSPEC, OSIRIS.

Large Binocular Telescope (LBT)

- * Multiple programs in 2014-2016 (P.I.'s: A. Conrad, D. Defrère). LBT Interferometer (LBTI): LMIR-cam, NOMIC; ALES.

The Atacama Large Millimeter Array (ALMA)

2. S. Luszcz-Cook et al. Cycle 4, Project 2016.1.00927.S.
1. P. Rojo et al. Cycle 3, Project 2015.1.00995.S.

Very Large Array (VLA)

1. I. de Pater et al. 2015A. Project 15A-119.

NOEMA Interferometer

1. L. Roth & A. Sanchez-Monge et al. 2017A. Project W16AA.

TEACHING, OUTREACH & LEADERSHIP

Lead Instructor, Introductory Lab Physics, Patten University at San Quentin State Prison, San Quentin, CA. Position includes: syllabus creation and instruction for a college-level laboratory physics course taught to inmates at San Quentin prison; management of two instructors and two tutors; creation of lab experiments subject to prison regulations. **Fall 2016**

Outreach Collaborator, Guerilla Science. Collaborator on numerous large-scale science outreach events at schools, music festivals, and co-working spaces across California and New York. **2012-present**

Graduate Student Instructor, UC Berkeley

A121 Radio Astronomy Laboratory **Spring 2015**

C162 The Solar System **Fall 2012**

A122 Infrared and Optical Astronomy Laboratory **Fall 2010**

Instructor & Curriculum Designer, Five Stars Mentoring Program, Girls Inc., Oakland, CA. Hands-on astronomy course for underprivileged middle and high school girls. **Fall 2013**

Lead Field Staff (full-time), Pacific Quest, Na'alehu, HI. Field instructor for at-risk young adults in wilderness therapy setting. Position included: management of two staff and 15 young adults; coordination with therapists to carry out individualized therapy plans for students; directing students in running an organic farm. **2011**

Instructor (full-time), Astrocamp, Guided Discoveries, Idyllwild, CA. Physics and astronomy outdoor education camp for middle school students. **Spring 2010**

Undergraduate Teaching Assistant, MIT

12.409 Hands-On Astronomy **2008-2009**

Co-creator and Co-teacher, "Hands-on Astronomy", MIT High School Studies Program. Extracurricular weekly class for local high school students. **2008**

Public Talks & Star Parties, various locations **2005-present**

RESEARCH ADVISING

Clayton Cantrall, Undergraduate Student, UC Berkeley

2015-present

Co-advised with Imke de Pater

Sara Gutierrez, Undergraduate Student, UC Berkeley **2014-present**
Co-advised with Imke de Pater

Thomas Fitzpatrick, Undergraduate Student, UC Berkeley **2014-present**
Co-advised with Imke de Pater

PUBLICITY

Press Release, UC Berkeley/Keck/Gemini/AAS DPS, “Long-term, hi-res tracking of eruptions on Jupiter’s moon Io” **Oct 2016**

Press Conference, AAS DPS Meeting, “Long-term, hi-res tracking of Io’s eruptions” **Oct 2016**

GeminiFocus Featured Article, “Gemini captures extreme eruption on Io” **Oct 2014**

Image Release, Gemini Observatory “Extreme volcanism: Image captures one of the brightest volcanoes ever seen in the Solar System” **Aug 2014**

Press Release, UC Berkeley “A hellacious two weeks on Jupiter’s moon Io” **Aug 2014**

PROFESSIONAL ACTIVITIES & SERVICE

Keck Expert, Solar System Panel, Keck-JWST Meeting **Sep 2016**

Discipline Leader, Satellites Working Group, International Outer Planet Watch **2016-present**

Steering Committee Member, International Outer Planet Watch **2016-present**

Mentor, Graduate-Undergraduate Mentoring Program, UC Berkeley **2016-present**

External Grant Reviewer, NASA **2016-present**

Mentor, Society for Women in the Physical Sciences, UC Berkeley **2016-present**

Public Liaison, Astronomy Department, UC Berkeley **2015-present**

Referee for *Icarus* **2015-present**

Graduate Assembly Delegate, Astronomy Department, UC Berkeley **2013-2015**

Residential Advisor, Dept of Residential Life, MIT **2008**

REFEREED PUBLICATIONS

**student advised*

21. *Cantrall, C., **de Kleer, K.**, de Pater, I., Williams, D., Davies, A.G., Nelson, D. Variability and geologic associations of volcanic activity on Io in 2001-2016. *Icarus*, *submitted*.
20. Hueso, R., Kivits, W., Simon, A., Rojas, J., Gorczynski, P., Ammons, M., Law, N., Riddle, R., Sánchez-Lavega, A., Tollefson, J., **de Kleer, K.**, and 24 co-authors. Neptune long-lived atmospheric features in 2013-2015 from small (28 cm) and large (10 m) telescopes. *Icarus*, *in press*.
19. **de Kleer, K.** and de Pater, I. Our solar system - A panorama. In *Handbook of Exoplanets*, *in press*.
18. de Pater, I., **de Kleer, K.**, Davies, A., Ádámkóvics, M. Three decades of Loki Patera observations. *Icarus*, *in press*.
17. Crossfield, I.J.M., Ciardi, D.R., Isaacson H., Howard, A.W., Petigura, E.A., Weiss, L.M., Fulton, B.J., Sinukoff, E., Schlieder, J.E., Mawet, D., Ruane, G., de Pater, I., **de Kleer, K.**, and 11 co-authors. Two small transiting planets and a possible third body orbiting HD 106315. arXiv:1701.03811 (2017).
16. **de Kleer, K.**, Skrutskie, M., Leisenring, J., Davies, A.G., Conrad, A., de Pater, I., Resnick, A., Bailey, V., Defrère, D., Hinz, P., Skemer, A., Spalding, E., Vaz, A., Veillet, C., Woodward, C.E. Multi-phase volcanic resurfacing at Loki Patera on Io. *Nature*, **545**, 199-202 (2017).
15. **de Kleer, K.** and de Pater, I. Io’s Loki Patera: Modeling of Three Brightening Events in 2013-2016. *Icarus* 289, 181-198 (2017).
14. M. Shepard, J. Richardson, P. Taylor, L. Rodrigues-Ford, A. Conrad, I. de Pater, M. Ádámkóvics, **K. de Kleer**, and 14 co-authors. Radar observations and shape model of asteroid 16 Psyche. *Icarus*, 281, 388 (2017).
13. **de Kleer, K.** and de Pater, I. Spatial distribution of Io’s volcanic activity from near-IR adaptive optics observations on 100 nights in 2013-2015. *Icarus*, 280, 405 (2016).
12. **de Kleer, K.** and de Pater, I. Time variability of Io’s volcanic activity from near-IR adaptive optics observations on 100 nights in 2013-2015. *Icarus*, 280, 378 (2016).
11. de Pater, I., Laver, C., Davies, A.G., **de Kleer, K.**, Williams, D.A., Howell, R.R., Rathbun, J.A., Spencer, J.R. Io: Eruptions at Pillan, and the time evolution of Pele and Pillan from 1996 to 2016. *Icarus* 264, 198 (2016).
10. Luszcz-Cook, S., **de Kleer, K.**, de Pater, I., Ádámkóvics, M., Hammel, H.B. Retrieving Neptune’s aerosol properties from Keck OSIRIS Observations. I. Dark Regions. *Icarus*, 276, 52 (2016).
9. Conrad, A., **de Kleer, K.**, Leisenring, J., La Camera, A., and 16 co-authors. Spatially-resolved M-band emission from Io’s Loki Patera – Fizeau imaging at the 22.8 meter LBT. *AJ*, 149, 175 (2015).

8. **de Kleer, K.**, Luszcz-Cook, S., de Pater, I., Ádámkóvics, M., Hammel, H. Clouds and aerosols on Uranus: Radiative transfer modeling of spatially-resolved near-infrared Keck spectra. *Icarus* 256, 120 (2015).
7. Crossfield, I., Petigura, E., Schlieder, J.E., Howard, A.W., Fulton, B.J., Aller, K.M., Ciardi, D.R., Lépine, S., Barclay, T., de Pater, I., **de Kleer, K.**, Quintana, E.V., and 15 co-authors. A nearby M star with three transiting super-Earths discovered by K2. *ApJ* 804, 10 (2015).
6. **de Kleer, K.**, de Pater I., Davies, A., Ádámkóvics, M. Near-infrared monitoring of Io & detection of a violent outburst in August 2013. *Icarus* 242, 352 (2014).
5. **de Kleer, K.**, de Pater, I., Ádámkóvics, M., Hammel, H. Near-Infrared Spectra of the Uranian Ring System. *Icarus* 226, 1038 (2013).
4. Hicken, M., Challis, P., Kierschner, R.P., Rest, A., Cramer, C.E., Wood-Vasey, W.M., Bakos, Gaspar, Berlind, Perry., Brown, W.R., Caldwell, N., Calkins, M., Currie, T., **de Kleer, K.**, and 26 co-authors. CfA4: Light Curves for 94 Type Ia Supernovae. *ApJ Supplement* 200, 12 (2012).
3. de Pater, I., Wong, M.H., **de Kleer, K.**, Hammel, H., Ádámkóvics, M, Conrad, A. Keck adaptive optics images of Jupiter's north polar cap and Northern Red Oval, *Icarus* 213, 559 (2011).
2. Tripathi, A., Winn, J.N., Johnson, J.A., Howard, A.W., Halverson, S., Marcy, G.W., Holman, M.J., **de Kleer, K.**, Carter, J.A., Esquerdo, G.A., Everett, M.E., Cabrera, N.E. A Prograde, Low-inclination Orbit for the very hot Jupiter WASP-3b. *ApJ* 715, 421 (2010).
1. Jenniskens, P., **de Kleer, K.**, Vaubaillon, J., Trigo-Rodríguez, J.M., Madiedo, J.M., and 9 co-authors. Leonids 2006 Observations of the Tail of Trails. *Icarus* 196, 171 (2008).

UN-REFEREED PROCEEDINGS

2. Leisenring, J.M., Hinz, P.M., Skrutskie, M., Skemer, A., Woodward, C.E., Veillet, C., Arcidiacono, C., Bailey, V., Bertero, M., Boccacci, P., Conrad, A., **de Kleer, K.**, de Pater, I., and 10 co-authors. Fizeau interferometric imaging of Io volcanism with LBTI/LMIRcam. *SPIE* 9146, 91462S (2014).
1. Lonsdale, C.J., **de Kleer, K.**, Diamond, P.J., Thrall, H., Lonsdale, C.J., Smith, H.E. OH emission and absorption associated with supernovae in Arp 220. *IAU Symposium*, 242, 432 (2007).

SEMINARS & COLLOQUIA

- Keck Observatory**, Lunch Talk: *Volcanic activity on Jupiter's moon Io* (June 27, 2017)
- UC Santa Cruz**, Planetary Lunch Seminar: *The volcanism, atmosphere, and tidal heating of Io* (April 27, 2017)
- MIT**, Special Seminar: *Planetary satellites in context: Io and the jovian system* (April 4, 2017)
- NASA JPL**, Planetary Science Seminar: *The volcanism, atmosphere, and tidal heating of Io* (May 9, 2016)
- California Institute of Technology**, Planetary Science Seminar: *The Volcanism, atmosphere, and tidal heating of Io* (May 3, 2016)
- Montana State University**, Physics Department Colloquium: *Understanding tidal heating through observations of Io's extreme volcanic activity* (Apr 22, 2016)
- Johns Hopkins University Applied Physics Lab**, Colloquium: *The Volcanism, atmosphere, and tidal heating of Io: A multi-year observing campaign* (Apr 8, 2016)
- NASA Goddard Space Flight Center**, Solar System Exploration Seminar: *Volcanic activity on Io: Recent observations and implications for tidal heating* (Apr 6, 2016)
- American Museum of Natural History**, Astrophysics Department Colloquium: *The Volcanism, atmosphere, and tidal heating of Io: A multi-year observing campaign* (Apr 5, 2016)
- MIT**, Planetary Lunch Colloquium: *The Volcanism, atmosphere, and tidal heating of Io: A multi-year observing campaign* (Mar 29, 2016)
- Harvard Center for Astrophysics**, Small-Scale Phenomena Seminar: *Volcanism and tidal heating on Io: Results from new AO observations* (Mar 28, 2016)
- Montana State University**, Earth Science Department Colloquium: *The extreme volcanism and dynamic atmosphere of Jupiter's moon Io* (Mar 3, 2016)
- UC Berkeley**, Astronomy Department Lunch Talk: *Volcanic activity on Io in 2013-2015* (Jan 28, 2016)
- Steward Observatory, The University of Arizona**, Seminar: *Near-infrared monitoring of Io and detection of three volcanic outbursts* (Mar 2015)
- UC Berkeley**, Astronomy Department Grad Student-Postdoc Seminar: *Atmospheres and volcanism in the*

Solar System: Near-infrared spectroscopy of Io and Uranus (Nov 2014)

UC Berkeley, Center For Integrated Planetary Sciences Seminar. *Connecting Io's volcanic activity to the plasma torus: Near-infrared observations during the Sprint-A/EXCEED Mission* (Apr 2014)

CONFERENCE
& WORKSHOP
PRESENTA-
TIONS

(invited) de Kleer, K. *Observing Io's surface with JWST*, Oort Workshop, Leiden, The Netherlands, Oral Presentation (May 2017)

(invited) de Kleer, K., Skrutskie, M., Leisenring, J., Davies, A.G., Resnick, A., Conrad, A., de Pater, I., Hinz, P., Defrère, Veillet, C. *Resolving Io's volcanoes from a mutual event observation at the Large Binocular Telescope*. AGU Fall Meeting, San Francisco, CA, Oral Presentation P54A-04 (Dec 2016)

de Kleer, K., de Pater, I., Yoneda, M. *Io's volcanic activity in 2013-2016 and comparison with extended sodium cloud variability*. AGU Fall Meeting, San Francisco, CA, Oral Presentation P21E-04 (Dec 2016)

de Kleer, K., de Pater, I. *The volcanism and tidal heating of Io*. Keck Science Meeting, Pasadena, CA, Oral Presentation (Sep 2016)

de Kleer, K., Skrutskie, M., Leisenring, J., de Pater, I., Davies, A.G., Conrad, A., Resnick, A.C., Hinz, P., Defrère, D., Veillet, C. *Time-evolution and thermal mapping of Io's Loki Patera at high resolution*. 48th AAS DPS/11th EPSC Joint Meeting, Pasadena, CA, Oral Presentation 517.12 (Oct 2016)

de Kleer, K., de Pater, I. *Two new brightening events at Io's Loki Patera*. AGU Fall Meeting, San Francisco, CA, Poster Presentation P31C-2074 (Dec 2015)

de Kleer, K., de Pater, I. *The spatial distribution of volcanic events on Io in 2013-2015*. 47th AAS DPS Meeting, National Harbor, MD, Oral Presentation 405.04 (Nov 2015)

de Kleer, K., de Pater, I. *Investigating variability in Io's volcanic activity and surface frosts: Results from 2013-2015*. ESO Planets Workshop, Santiago, Chile, Oral Presentation (Mar 2015)

de Kleer, K., de Pater, I., Davies, A.G., Ádámkóvics, M. *Io's volcanic activity from near-infrared observations during the EXCEED mission*. AGU Fall Meeting, San Francisco, CA, Oral Presentation P13E-02 (Dec 2014)

de Kleer, K., de Pater, I., Fitzpatrick, T. *A timeline of volcanic activity on Io in 2013-14 with near-infrared surface maps*. 46th AAS DPS Meeting, Tucson, AZ, Poster Presentation 418.13 (Oct 2014)

de Kleer, K., de Pater, I., Davies, A.G., Ádámkóvics, M., Ciardi, D. *Three rare volcanic outbursts on Io in August 2013*. 48th ESLAB Symposium, Noordwijk, The Netherlands, Oral Presentation (Jun 2014)

de Kleer, K., de Pater, I., Ádámkóvics, M. *Infrared observations of SO emission from Io's atmosphere during eclipse*. AGU Fall Meeting, San Francisco, CA, Poster Presentation P43A-2003 (Dec 2013)

de Kleer, K., de Pater, I., Davies, A.G., Luszcz-Cook, S., Ádámkóvics, M. *Monitoring Io in the near-infrared*. Io Boulder Workshop, Boulder, CO, Oral Presentation (Oct 2013)

de Kleer, K., de Pater, I., Luszcz-Cook, S., Ádámkóvics, M., Hammel, H., Fry, P. *Clouds, hazes, and rings: Keck observations of Uranus*. 45th AAS DPS Meeting, Denver, CO, Poster Presentation 312.19 (Oct 2013).

de Kleer, K., de Pater, I., Hammel, H., Ádámkóvics, M., Luszcz-Cook, S. *Keck observations of the Uranian atmosphere and rings*. 42nd AAS DPS Meeting, Pasadena, CA Poster Presentation 11.32 (Oct 2010).

de Kleer, K., Lonsdale, C.J., Diamond, P.J., Lonsdale, C.J., Smith, G., Thrall, H. *Time variation in OH megamaser emission and absorption toward radio supernovae in Arp 220*. 209th AAS/AAPT Joint Meeting, Seattle, WA, Poster Presentation 149.19 (Jan 2007).