

CURRICULUM VITAE

Kaveh Pahlevan

CONTACT INFORMATION

School of Earth & Space Exploration
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EDUCATION

2010 Ph.D., Planetary Science, California Institute of Technology
2006 M.S., Planetary Science, California Institute of Technology
2004 B.S., Astronomy with Honors, University of Maryland

ACADEMIC APPOINTMENTS

2016 – Postdoctoral Fellow, Earth & Space Exploration, Arizona State University
2013 – 16 Poincaré Fellow, Lagrange Laboratory, Observatoire de la Côte d’Azur, Nice
2010 – 13 Bateman Fellow, Geology and Geophysics, Yale University

HONORS AND AWARDS

2015 Nature Editor’s Choice (for Nature paper published in the same year)
2013 Henri Poincaré Fellowship (Observatoire de la Côte d’Azur)
2010 Bateman Postdoctoral Fellowship (Yale University)
2010 Institute Postdoctoral Fellowship (ETH Zurich – declined)
2007 Nature Research Highlights (for EPSL paper published in same year)
2004 Institute Research Fellowship (Caltech)

RESEARCH GRANTS

2018 Evolution of Primordial Atmospheres: Linking Models with Observations, NASA Emerging Worlds Program, **PI**, 12/1/2018-11/30/2021 (selected, \$144,601)
Born wet: characterizing the earliest water ocean epoch on Mars, NASA Habitable Worlds Program, **Co-I**, 08/01/2019-07/31/2022 (pending)

PUBLICATIONS

2018 **Pahlevan, K.**, Schaefer, L., Hirschmann, M.M. Magma ocean outgassing and hydrogen isotopic constraints on the Hadean Earth (submitted to *Earth and Planetary Science Letters*)
Canup, R., Righter, K., Dauphas, N., **Pahlevan, K.**, Cuk, M., Lock, S., Stewart, S., Salmon, J., Rufu, R., Nakajima, M., Magna, T. Origin of the Earth and Moon (submitted for inclusion in *New Views of the Moon II*)
Pahlevan, K., Gammie, C. Isotopic fractionation in the proto-lunar disk: constraints on equilibration (submitted to *Earth and Planetary Science Letters*)
Wu, J., Desch, S., Schaefer, L., Elkins-Tanton, L., **Pahlevan, K.**, Buseck, P.

- Origin of Earth's water: chondritic inheritance plus nebular ingassing and storage of hydrogen in the core, *Journal of Geophysical Research – Planets*, 123, 2691–2712.
- Greenwood, J. P., Karato, S. I., Vander Kaaden, K. E., **Pahlevan, K.**, Usui, T. Water and Volatile Inventories of Mercury, Venus, the Moon, and Mars. *Space Science Reviews*, 214(5), 92.
- Pahlevan, K.** Telltale tungsten and the Moon, *Nature Geoscience*, 11, 16-18.
- 2016 **Pahlevan, K.**, Karato, S., Fegley, B. Speciation and dissolution of hydrogen in the proto-lunar disk, *Earth and Planetary Science Letters*. 445, 104-113.
- 2015 **Pahlevan, K.**, Morbidelli, A. Collisionless encounters and the origin of the lunar inclination, *Nature*, 527, 492-494. News and Views: The Moon's tilt for Gold, 455-456.
- 2014 **Pahlevan, K.** Isotopes as tracers of the sources of the lunar material and processes of lunar origin. *Philosophical Transactions of the Royal Society A*. 372, 20130257.
- 2011 **Pahlevan, K.**, Stevenson, D.J., Eiler, J. Chemical fractionation in the silicate vapor atmosphere of the Earth, *Earth and Planetary Science Letters*. 301, 433-443.
- 2009 Li, K-F., **Pahlevan, K.**, Kirschvink, J.L., Yung, Y.L. Atmospheric pressure as a natural climate regulator for a terrestrial planet with a biosphere, *Proceedings of the National Academy of Sciences*, 106 (24) 9576-9579.
- 2007 **Pahlevan, K.**, Stevenson, D.J. (2007) Equilibration in the aftermath of the lunar forming giant impact, *Earth and Planetary Science Letters*. 262, 438-449. News and Views: Isotopic Lunacy, *Nature*, 450, 356-357.

INVITED TALKS

- 2018 "D/H constraints on early planetary evolution on Earth and Mars", Dept. of Geosciences, University of Wisconsin, Madison, Wisconsin, December 6.
"Oxygen fugacity of the primordial atmosphere and the early oxidation of the mantle", Natural Environment Research Council Headquarters, Swindon, UK, March 14.
- 2017 "A massive hydrogen-rich Martian greenhouse recorded in D/H", Department of Terrestrial Magnetism, Carnegie Institution of Washington, November 16.
"Chemical and dynamical signatures of Earth-Moon origin", University of Illinois, Urbana-Champaign, April 12.
- 2016 "Interpreting the isotopic record: signatures of planetary origin", Institute of Geological Sciences, Freie Universität, Berlin, October 13.
"Cosmochemical and dynamical signatures of lunar origin", Institute de Physique du Globe de Paris (IPGP), Paris, January 28.
- 2015 "Cosmochemical and dynamical signatures of lunar origin", Seminar at the Observatoire de la Côte d'Azur (OCA), Nice, France, November 12.
"Cosmochemical and dynamical signatures of lunar origin", Laboratoire de Geology, Ecole Normale Supérieure (ENS), Lyon, November 11.

- 2014 “Cosmochemical signatures of lunar origin via giant impact”, Institute of Geochemistry and Petrology, Swiss Federal Institute of Technology (ETH), Zurich, October 2.
- 2013 “Cosmochemical signatures of lunar origin via giant impact”, Le Centre de Recherche Pétrographique et Géo chimique (CRPG), Nancy, January 30.
 “Evolution of the proto-lunar disk: constraints from the isotopic record”, Seminar, Observatoire de la Côte d’Azur (OCA), Nice, France, Sept. 19.
 “Evolution of the proto-lunar disk: constraints from the isotopic record”, Southwest Research Institute (SwRI), Boulder, Colorado, July 10.
 “Evolution of the proto-lunar disk: constraints from the isotopic record”, School of Physics, University of Bristol, Bristol, UK, March 18.
- 2012 “When the Moon was a Cloud: A Creation Myth”, Department of Earth Sciences, Oxford University, Oxford, UK, May 21.
 “When the Moon was a Cloud: A Creation Myth”, Seminar at the Observatoire de la Côte d’Azur (OCA), Nice, France, May 10.
 “When the Moon was a Cloud: A Creation Myth”, Lunar & Planetary Institute (LPI) Spring Seminar Series, Houston, Texas, March 30.
 “When the Moon was a Cloud: A Creation Myth”, GEOTOP Seminar Series, Department of Earth and Planetary Sciences, McGill University, Montreal, February 24.
- 2011 “When the Moon was a Cloud: A Creation Myth”, Department of Earth and Planetary Sciences Colloquium, Harvard University, Cambridge, Nov. 7.
 “When the Moon was a Cloud: A Creation Myth”, Department of Geosciences, State University of New York (SUNY) at Stony Brook, New York, September 22.
 “Neutrinos and the History of the Sun’s Luminosity”, Institute for Theory and Computation (ITC) Luncheon, Center for Astrophysics (CfA), Harvard University, Cambridge, April 5.
 “When the Moon was a Cloud: A Creation Myth”, Institute for Theory and Computation (ITC) Colloquium, Center for Astrophysics (CfA), Harvard University, Cambridge, April 5.
 “When the Moon was a Cloud: A Creation Myth”, Department of Astronomy Seminar, University of Texas at Austin, Texas, March 14.
- 2010 “When the Moon was a Cloud: A Creation Myth”, Department of Astronomy Seminar, University of Maryland, College Park, November 23.
 “Towards a Predictive Theory of Lunar Origin”, Department of Geosciences Colloquium, Brown University, Providence, November 18.
 “The Giant Impact Hypothesis – Where We Stand”, Department of Geosciences Lunch Seminar, Brown University, Providence, November 18.
 “Chemical and Isotopic Consequences of the Moon-forming Giant Impact” Department of Geosciences, Solid Earth Brown Bag Seminar, Princeton University, Princeton, September 24.
- 2009 “When the Moon was a Cloud: A Creation Myth”, Institute of Geochemistry and Mineral Resources Seminar, Swiss Federal Institute of Technology (ETH), Zurich, July 3.

“When the Moon was a Cloud: A Creation Myth”, Department of Terrestrial Magnetism (DTM) Seminar, Carnegie Institute of Washington, July 29.

“Fractionation after the Moon-Forming Giant Impact”, Geochemistry Seminar, Department of Earth, Planetary, and Space Sciences, University of California, Los Angeles (UCLA), May 6.

CONFERENCE/WORKSHOP ABSTRACTS & PRESENTATIONS

- 2018 Schaefer, L., Elkins-Tanton, L. T., **Pahlevan, K.** Ferric Iron Production in Magma Oceans and Evolution of Mantle Oxidation State, Differentiation: Building the Internal Architecture of Planets workshop, Pasadena, California.
- 2017 **Pahlevan, K.**, Schaefer, L., Elkins-Tanton, L., Desch, S. A massive hydrogen-rich primordial greenhouse recorded in Martian D/H, American Geophysical Union, Fall Meeting, New Orleans.
Schaefer, L., Elkins-Tanton, L. T., **Pahlevan, K.** Redox Evolution in Magma Oceans Due to Ferric/Ferrous Iron Partitioning, American Geophysical Union, Fall Meeting, New Orleans.
Pahlevan, K., Elkins-Tanton, L. Tidal Dissipation on the Post-Giant-Impact Earth, International interdisciplinary workshop on accretion and early differentiation of the terrestrial planets, Nice, France.
Pahlevan, K., Schaefer, L., Elkins-Tanton, L., Desch, S., Karato, S. Hydrogen isotopic fractionation during crystallization of the terrestrial magma ocean, Lunar & Planetary Science Conference, The Woodlands, Texas.
- 2016 **Pahlevan, K.**, Karato, S. Hydrogen isotopic fractionation during crystallization of the terrestrial magma ocean, American Geophysical Union, Fall Meeting, San Francisco.
Pahlevan, K. Isotopic constraints on proto-lunar disk evolution, 47th Lunar & Planetary Science Conference, The Woodlands, Texas.
- 2015 **Pahlevan, K.** Major element isotopic fractionation in the proto-lunar disk, Goldschmidt Conference, Prague.
Pahlevan, K., Morbidelli, A. Collisionless encounters and the origin of the lunar inclination, Solar System Bombardment III, Houston.
- 2014 **Pahlevan, K.**, Morbidelli, A. Excitation of the lunar inclination via three-body interactions, International interdisciplinary workshop on accretion and early differentiation of the terrestrial planets, Nice, France.
Pahlevan, K., Morbidelli, A. The lunar inclination as a dosimeter for terrestrial late stage accretion, 45th Lunar & Planetary Science Conference, The Woodlands, Texas.
- 2013 **Pahlevan, K.** Isotopic Constraints on Physical Models, Royal Society Meeting on the Origin of the Moon, Chicheley Hall, Buckinghamshire, UK (invited).
Pahlevan, K., Karato, S., Fegley, B. Loss of Volatile Elements After the Moon-Forming Giant Impact, Goldschmidt Conference, Florence.

- Pahlevan, K.** Developing the Rare Earth Element Constraint for Scenarios of Lunar Origin, 44th Lunar & Planetary Science Conference, The Woodlands, Texas.
- 2012 **Pahlevan, K.** What do Moons of Terrestrial Planets Tell us about their Origins? Planetary Origins and Frontiers of Exploration, Weizmann Institute of Science, Rehovot, Israel (keynote).
Pahlevan, K. Origin of the Moon – Evolution of an Impact-Generated Disk, Micro-symposium 53 (co-sponsored by Brown University, Vernadsky Institute, MIT, and the NASA Lunar Science Institute), The Woodlands, Texas (keynote).
Stoddard, P. S., **Pahlevan, K.**, Tumber, S., Weber, R., Lee, K. K. Laboratory synthesis of silicate glass spherules: Application to impact ejecta, American Geophysical Union, Fall Meeting, San Francisco.
- 2011 **Pahlevan, K.** Isotopic Abundances as Tracers of the Processes of Lunar Formation, American Geophysical Union, Fall Meeting (invited).
Pahlevan, K., Karato, S. Volatile Loss via Outgassing of the Lunar Magma Ocean, Goldschmidt Conference, Prague.
- 2010 Fitoussi, C., Bourdon, B., **Pahlevan, K.**, Wieler, R. Si Isotope Constraints on the Moon-forming Impact, 41st Lunar & Planetary Science Conference, The Woodlands, Texas.
- 2009 **Pahlevan, K.**, Stevenson, D.J. Chemical Fractionation after the Moon-forming Giant Impact, 40th Lunar & Planetary Science Conference, The Woodlands, Texas.
- 2008 **Pahlevan, K.**, Stevenson, D.J. Volatile loss Following the Moon-forming Giant Impact, Goldschmidt Conference, Vancouver.
- 2007 **Pahlevan, K.**, Stevenson, D.J. Equilibration of the Earth-Moon System Following the Giant Impact, Goldschmidt Conference, Cologne.
Pahlevan, K., Stevenson, D.J. “Mixing During Planet Formation and After the Moon-Forming Impact” Theoretical Institute for Advanced Research in Astrophysics Workshop, Academia Sinica, Taipei, July 31 (invited).
- 2006 **Pahlevan, K.**, Stevenson, D.J. Mixing in the Aftermath of the Giant Impact – Implications for Planet Formation, Meeting of the Division for Planetary Sciences of the American Astronomical Society, Pasadena, CA.
- 2005 **Pahlevan, K.**, Stevenson, D.J. The Oxygen Isotope Similarity of the Earth and Moon: Source Region or Formation Process? 36th Lunar & Planetary Science Conference, Houston, Texas.

SERVICE TO THE PROFESSION

- 2009-2018 **Peer-Review Referee Service**
Science, Nature, Nature Geoscience, Icarus, Earth & Planetary Science Letters, Journal of Geophysical Research, Astronomy & Astrophysics, Geochim. et Cosmochim. Acta, Phil. Trans. Royal Soc. A
- 2013-2017 **Grant Proposal/Fellowship Review Service**
External Reviewer, Swiss National Science Foundation (SNSF)

External Reviewer, NASA Earth & Space Science Fellowship (NESSF)
Executive Secretary for NASA Origins of Solar Systems (OSS) Panel

2014-2017 **Conference Service**

Contributed talk session co-chair on “Signatures of Accretion and Core Formation”, Goldschmidt Conference, Paris, August 2017
Scientific Organizing Committee, Workshop on Solar System Bombardment III held at the Lunar and Planetary Institute, Houston, Texas, February, 2015
Contributed talk session co-chair on: “Protolunar Disk and Magma Ocean: Models and Sample Constraints”, Lunar & Planetary Science Conference, The Woodlands, Texas, March, 2014.

PROFESSIONAL SOCIETY MEMBERSHIPS

2004- American Geophysical Union
2006- American Astronomical Society
2007- Geochemical Society

TEACHING EXPERIENCE

2010-12 **Yale University**

Guest Lecturer
Planet Formation
Exoplanets

2006-09 **California Institute of Technology**

Guest Lecturer
Planetary Structure and Evolution
Composition, Structure, and Chemistry of Planetary Interiors
Planetary Evolution and Habitability
Teaching Assistant
Planetary Structure and Evolution
Order of Magnitude Physics

SELECTED PRESS COVERAGE

2018 American Geophysical Union Newsroom, November 7, 2018, “Scientists theorize new origin story for Earth’s water” by Lauren Lipuma; Link: <https://bit.ly/2KpYkgb>

2015 The NY Times, November 27, 2015, “Scientists Link Moon’s Tilt and Earth’s Gold” by Kenneth Chang; Link: <https://nyti.ms/2Ty4H5j>
The LA Times, November 25, 2015, “Gold and platinum offer clues about moon’s mysterious tilt” by Karen Kaplan; Link: <https://lat.ms/2KpUcwr>

2012 The Chicago Tribune, March 29, 2012, “Moon struck?” by Cynthia Dizikes; Link: <https://trib.in/2AcJcOz>

2011 New Scientist, January 5, 2011, “Did magma rain on the early Earth?”; Link: <https://bit.ly/2Tvvnv57>