

# Curriculum Vitae

## Prof. Dr. Ralf-Ingo Kaiser

Department of Chemistry, University of Hawaii at Manoa, Honolulu, HI 96822, USA  
W.M. Keck Research Laboratory in Astrochemistry, University of Hawaii at Manoa, Honolulu, HI 96822, USA  
<http://www.chem.hawaii.edu/Bil301/welcome.html>  
<http://www.chem.hawaii.edu/Bil301/KLA.html>

### Professional Preparation

University of Münster (Germany)	Chemistry	Pre-Diploma	1988
University of Münster (Germany)/	Chemistry	Diploma	1991
Nuclear Research Center Jülich (Germany)			
University of Münster (Germany)/	Chemistry	Ph.D	1994
Nuclear Research Center Jülich (Germany)	Summa Cum Laude		
University of California (Berkeley)	Reaction Dynamics	Post doc	1994-1997
University of Chemnitz (Germany)/			
Institute of Atomic and Molecular			
Sciences Academia Sinica (Taiwan)	Physics	Habilitation	1997-2002

### Appointments

9/2016-present	Visiting Professor, Samara University (RUS)
9/2012-8/2016	Visiting Professor, Department of Physics, Open University (UK)
6/2008-present	Director W.M. Keck Laboratory in Astrochemistry, University of Hawai'i at Manoa
8/2007-present	Professor, Department of Chemistry, University of Hawai'i at Manoa
8/2007-12/2014	Professor, NASA Astrobiology Institute, University of Hawaii at Manoa
8/2002-7/2007	Visiting Professor, Centre for Astrobiology, Open University (UK)
8/2004-8/2007	Associate Professor, NASA Astrobiology Institute, University of Hawaii at Manoa
8/2004-7/2007	Associate Professor, Department of Chemistry, University of Hawai'i at Manoa
8/2002-7/2004	Assistant Professor, Department of Chemistry, University of Hawai'i at Manoa
10/2000-7/2002	Lecturer, Department of Chemistry, University of York (UK)
8/1998-9/2000	Visiting Assistant Professor, Department of Physics, National Taiwan University, Taiwan
1/1998-7/1998	Visiting Assistant Professor, Tamkang University, Dept. Chemistry, Taiwan

### Research Interests & Publications (H-Index 47)

Astrochemistry & Astrobiology (interstellar medium, Solar System, sugars, amino acids, dipeptides, DNA/RNA)  
Planetary Sciences (planetary atmospheres, icy bodies, Kuiper Belt Objects, comets, silicate catalysis)  
Reaction Dynamics & Kinetics (gas phase, condensed phase, levitated particles and droplets)  
Radiation Chemistry (condensed phase, material sciences)  
Atmospheric Chemistry (ozone, isotopic enrichments, reaction intermediates, planetary atmospheres)  
Combustion & Energy (combustion flames, rocket propulsion systems, biofuel)  
Material Sciences (ionic liquids, Jet Fuels, Si-, B-, C-nanostructures, high energy material, CVD processes)  
Surface Science (high temperature combustion; low temperature ices)  
Synchrotron Radiation (Combustion, Catalysis, Astrochemistry, Energy Sciences, Planetary Systems)  
Instrumental Development (UHV, analytical, gas phase and condensed phase)

### Extramural Research Support (\$ 18.3 M)

Particle Physics and Astronomy Research Council (PPARC) (UK)	2001-2003
W.M. Keck Foundation	2008-2011
Department of Energy, Basic Energy Sciences (DOE; BES)	2003-
National Aeronautics and Space Administration (NASA; SERVI, EW, SSW, HW)	2003-
National Science Foundation (NSF; CAREER, CRC, ASTR, CHE)	2003-
US Air Force Office of Scientific Research (AFOSR; Dynamics & Theory, Combustion)	2004-
US Army Research Office (ARO)	2013-
US Office of Naval Research (ONR)	2015-
NSRC-ECNU	2018-

### Professional Societies

American Astronomical Society (DPS/LAD), American Geophysical Union (AGU), American Vacuum Society

### Fellow of Professional Societies

Royal Astronomical Society (UK) (2005), Royal Society of Chemistry (UK) (2011), American Physical Society (2012), American Association for the Advancement of Science (AAAS) (2013), Institute of Physics (UK) (2014)  
American Chemical Society (ACS) (2017)

## Honors and Awards

2017	Fellow of the American Chemical Society (ACS) “for pioneering the use of molecular beams and surface science experiments to investigate chemical reactions in the gas and condensed phase that lead to the complex molecules observed by astronomers throughout the universe”	
2014	Fellow of Institute of Physics (IOP) (UK)	
2013	Fellow of the American Association for the Advancement of Science (AAAS) “ <i>for distinguished contributions in the field of reaction dynamics, particularly for understanding formation mechanisms of complex molecules in extraterrestrial environments and in combustion systems</i> ”.	
2012	Fellow of the American Physical Society “ <i>For pioneering experimental investigations of the chemical evolution of the Solar System and the Interstellar medium using crossed molecular beams and surface scattering to probe the underlying phenomena on the most fundamental, microscopic level</i> ”	
2011	Fellow of the Royal Society of Chemistry (UK)	
2008	W.M. Keck Research Laboratory in Astrochemistry (KLA)	
2007	University of Hawaii Regents <i>Excellence in Research</i> Award (Associate Professor)	
2007	University of Hawaii <i>Outstanding Undergraduate Teaching</i> Award	
2006-2012	NSF Collaborative Research Award in Chemistry	
2005	Fellow of the Royal Astronomical Society (UK)	
2004	<i>Advisory Award</i> , Talent Development Hawaii	
2003	<i>Advisory Award</i> , Talent Development Hawaii	
2002-2007	NSF-CAREER Award	
1997-2000	DFG Habilitation Fellowship	(USA/ROC)
1997	Outstanding Performance Award, Lawrence Berkeley National Laboratory	(USA)
1994-1996	DFG Postdoctoral Research Fellowship	(USA)
1994	Outstanding PhD Award, German Industry Foundation	(Germany)
1994	DFG Science Conference Fellowship	(Japan)
1991-1994	KFA PhD Fellowship, Nuclear Research Center Juelich	(Germany)
1990-1991	KFA Diploma Fellowship, Nuclear Research Center Juelich	(Germany)

## Conference Organization

- 2017 Expanding the Frontiers in Condensed Phase Astrochemistry ACS Spring Meeting, Chair
- 2015 Laboratory Astrophysics Workshop (ICE-2015), Kauai, Co-Chair
- 2014 Biochemistry in Extreme Environments, ACS Fall Meeting, Co-Chair
- 2014 Chemistry of the Interstellar Medium, ACS Spring Meeting, Co-Chair
- 2013 New Chemical Frontiers in Solar System Exploration, ACS Fall Meeting, Chair
- 2013 Laboratory Astrophysics Workshop (ICE-2013), Kauai, Chair
- 2012 AOGS-AGU, Singapore, Laboratory Planetary Science Session, Co-Chair
- 2012 6<sup>th</sup> Titan Workshop, Florida, 'Chemistry – Observations, Experiments, Computations, and Modeling, Co-Chair
- 2011 5<sup>th</sup> Titan Workshop, Kauai, 'Chemistry – Observations, Experiments, Computations, and Modeling, Chair
- 2010 4<sup>th</sup> Titan Workshop, France, 'Chemistry – Observations, Experiments, Computations, and Modeling, Co-Chair
- 2010 Pacifichem, Honolulu, Chair, Kuiper Belt Symposium, Chair
- 2009 3<sup>rd</sup> Titan Workshop, Puerto Rico, 'Chemistry – Observations, Experiments, Computations, and Modeling, Co-Chair
- 2008 2<sup>nd</sup> Titan Workshop, Miami, 'Chemistry – Observations, Experiments, Computations, and Modeling, Co-Chair
- 2007 1<sup>st</sup> Titan Workshop, Honolulu, 'Chemistry – Observations, Experiments, Computations, and Modeling, Chair
- 2005 Pacifichem, Honolulu, Chair, Astrochemistry Symposium, Chair

## Recent Selected Press Coverage

Did life's building blocks form in interstellar ice?	Daily Mail	2016
Why Is Water So Essential for Life?	Live Science	2015
Are Dying Carbon Stars The Ultimate Source Of Our DNA?	Forbes	2015
DNA, Origins of Life: Hot Start to Life Described as 'Cosmic Barbecue'	Headlines & News	2015
A Hot Start to the Origin of Life?	LBNL News	2015
University Hawaii researchers: Life-building compound from space	Pacific Business News	2014
Key building block of life may have come from deep space	UH System	2014
Carbonic Acid Crystal Forms Clarified	The Biological SCENE	2014
Reduce Global Warming By Understanding How Fire Works	Science	2014
Evidence confirms combustion theory	Phys.Org. J	2014
Insights into Evolution of Life on Earth from Saturn's Moon Titan	Astrobiology News	2013
Evidence that comets could have seeded life on Earth	UC Berkeley	2013
Comets May Have Delivered Life's Early Building Blocks	KQED	2013
Hydrocarbon discovery provides clue to origins of life	UH System	2012
UH Manoa researchers discover novel chemical route	Science News	2012
Kaiser elected fellow to national physics society	UH System	2012
Molecules of the interstellar medium must break the rules	Science	2010
Peering into Titan's haze	Chemistry World	2009

## **Referee Funding Agencies**

Particle Physics and Astrophysics Research Council (PPARC, UK), American Chemical Society (PRF), US Department of Energy (Gas Phase/Condensed Phase), Army Research Office (ARO), National Science Foundation (Chemistry, Astronomy, Special Projects Office), Research Corporation, National Aeronautics and Space Administration (NASA), Leverhulme Trust (UK), German Research Council (DFG), American Chemical Society – Petroleum Research Fund, Air Force Office of Scientific Research (AFOSR)

## **Referee Internationally Circulated Journals and Publishers**

J. Chem. Phys, J. Phys. Chem., Chem. Phys. Lett., Chem. Phys., Angewandte Chemie International Edition, J. Organic Chemistry, J. Computational Chemistry, Monthly Notices Royal Astronomical Society, Astrophysical Journal, Astrophysical Journal Letters, Astrophysical Journal Supplement Series, Planetary Space Sciences, J. Geophysical Research – Planets, Int. J. Astrobiology, Astronomy & Astrophysics, Faraday Discussions, Phys. Chem. Chem. Phys., Cambridge University Press, John Wiley, Review of Scientific Instruments, Chem. Rev., Acc. Chem. Res., The Journal of the American Chemical Society, Chemical Physics, Astronomy & Astrophysics, J. Phys. Chem. Letters, Proceedings of the National Academy of Sciences, Science, International Journal of Mass Spectrometry, Chem. Soc. Review, International Reviews of Physical Chemistry, Nature, Nature Chemistry, Icarus, Chem. Phys. Chem., Nature Chemistry, NatureComm

## **Staff Scientists, Postdocs, Students**

Edwin Kawamura, Brant Jones, Xibin Gu, Fangtong Zhang, Abhijit Chakraborty, Ying Guo, Weijung Zheng, Fangtong Zhang, Le Wang, Li Zhou, Sun Zhang, Pavlo Maksyutenko, Courtney Ennis, Mausumi Goswami, Hakan Kayi, Seol Kim, Christopher Bennett, Stephen Brotton, Antony Wilson, Surajit Maity, Lloyd Muzangwa, Dorian Parker, Beni Dangi, Tao Yang, Jiao He, Marko Forstel, Sandor Gobi, Soumabha Bag, Harish Chakravarty, Alexandre Bergantini, Corey S. Jamieson, Andrew Turner, Matthew Abplanalp, Parker Crandall, Aaron Thomas, David S. Sillars, Helen Chapman [36]

## **Undergraduate Students**

Richard J. Morton, Colin Keyword, Matt Okazaki, Derek Larwick, Matt Lebar, Katie Olsen, Joycelyn G. Longenecker, William Carrier, Andy Chen, Lishen Li, Jeselle Perry, Edward Knox, Jennifer Nagamine, Sarah Lim, Simon Lee, Kellie Wo, Tyler Blair, Remvilyn Dayuha, Lauren Hill, Aleca Borsuk, Sean Saito, Brandon McMurtry, Jerid Liddiard, Anna Pravdina [24]

## **Visiting Scientists**

Phillips Holtom, Bhala Sivaraman, Sebastien Dupraz, Matthew Whiteman, Patrick Gasda, Holger Bettinger, Ararat Yeghikyan, Chinchun Chung, Arthur Suits, Gianfranco Vidali, Alfredo Quinto Hernandez, Lydie Bonal, Tetsuya Hama, Nick Evans, Nicolas Galante, Zhongyue Zhou, Refaat Mahfouz, Ada Tomosada, Nadia Balucani, Domenico Stranges, Sergiy Krasnokutskiy, Giovanni Strazzulla, Alexandre Bergantini, Sergio Pilling, Sergiy Krasnokutskiy, Yetsedaw Tsegaw, Gyorgy Tarczay [26]

## Recent Selected Invited Presentations

### 2018

University of Bochum, Department of Chemistry (Germany)	July	2018
Samara University (RUS)	July	2018
US Department of Energy Contractor's Meeting, DC	June	2018
Eastern China Normal University (ECNU) (China)	April	2018
Jiao Tong University, Engineering, Shanghai (China)	April	2018
University of Science and Technology (USTC) (China)	April	2018
Office of Naval Research Contractors Meeting, Purdue	March	2018
University of Tokyo & RIKEN, Tokyo (Japan)	January	2018

### 2017

Max Planck Institute for Astronomy, Heidelberg (Germany)	November	2017
Office of Naval Research Contractors Meeting, DC	August	2017
Army Research Office Contractors Meeting, DC	August	2017
National ACS Fall Meeting, Astrochemistry, DC	August	2017
University of Bochum, Department of Chemistry (Germany)	July	2017
Samara University (RUS)	July	2017
Dynamics of Molecular Collisions, CA	July	2017
International Chemistry of Chemical Bonding, HI	June	2017
Air Force Office of Scientific Research Contractor's Meeting (Combustion)	June	2017
US Department of Energy Contractor's Meeting, DC	June	2017
Japanese Geophysical Society – AGU Meeting (Japan)	May	2017
Naval Research Center Contractor's Meeting (Argonne)	February	2017

### 2016

University of Rome La Sapienza (Italy)	December	2016
Samara University (RUS)	November	2016
MACCCR Meeting Combustion, ANL	October	2016
Office of Naval Research Contractors Meeting, DC	August	2016
University of Bochum, Department of Chemistry (Germany)	July	2016
University of Muenster, Department of Physics (Germany)	July	2016
University of Cologne, Department of Physics (Germany)	July	2016
National Dong Hwa University, Department of Chemistry (ROC)	July	2016
Air Force Office of Scientific Research Contractor's Meeting (Combustion)	June	2016
US Department of Energy Contractor's Meeting, DC	June	2016
TU Berlin, Department of Physics	March	2016
Department of Chemistry, Virginia Commonwealth University	January	2016

### 2015

Pacifichem 2015 New Trends in Matrix Isolation, Honolulu	December	2015
Pacifichem 2015 Reaction Dynamics & Organosilicon Chemistry, Honolulu	December	2015
MACCCR Meeting Combustion, Sandia National Labs, Sandia	October	2015
National ACS Fall Meeting, Astrochemistry, Boston	August	2015
IAU Meeting Honolulu, Laboratory Astrophysics	August	2015
Gordon Research Conference Photochemistry	July	2015
Institute of Science and Technology (IST-Austria)	June	2015
University of Basel, Chemistry Department (CH)	June	2015

Air Force Office of Scientific Research Contractor's Meeting (Combustion)	June	2015
US Department of Energy Contractor's Meeting, DC	May	2015
Air Force Office of Scientific Research Contractor's Meeting (Dynamics)	May	2015
National ACS Spring Meeting, Astrochemistry, Denver	March	2015
Brown University, Department of Chemistry/Planetary Sciences	March	2015
ICE 2015 Laboratory Astrophysics Workshop, Kauai	February	2015
UC Davis, Department of Chemistry, Davis	January	2015
62 Dynamics and Spectroscopy Conference, Ventura	January	2015
Department of Physics & Astronomy, Open University (UK)	January	2015

## 2014

Purdue University, Department of Chemistry/EAPS	November	2014
Air Force Office of Scientific Research Contractor's Meeting (Combustion)	October	2014
Workshop on Interstellar Matter 2014, Sapporo (Japan)	October	2014
University of Bochum, Chemistry Department	August	2014
National ACS Fall Meeting, Biochemistry, San Francisco	August	2014
University of Muenster, Department of Physics (Germany)	July	2014
Technical University of Vienna, Department of Chemistry (Austria)	July	2014
University of Bochum, Department of Chemistry (Germany)	July	2014
Air Force Office of Scientific Research Contractor's Meeting (Combustion)	June	2014
US Department of Energy Contractor's Meeting, DC	May	2014
Air Force Office of Scientific Research Contractor's Meeting (Dynamics)	May	2014
Petroleum Institute, Abu Dhabi (United Arabian Emirates)	May	2014
Faraday Discussion 168, Dust in the Universe, Leiden (The Netherlands)	April	2014
National ACS Spring Meeting, Astrochemistry, Dallas	March	2014

## 2013

Department of Physics, University of Hawaii at Manoa	November	2013
Synthesis and Spectroscopy of Large Carbon Molecules, Harvard-Smithsonian	October	2013
National ACS Fall Meeting, Astrochemistry Meeting, Indianapolis	September	2013
The Molecular Physics of Interstellar PAHs, Lorentz Workshop (The Netherlands)	July	2013
UH NASA Astrobiology Institute Meeting, Honolulu	July	2013
National ACS Spring Meeting, Reaction Dynamics Meeting, New Orleans	April	2013
King Abdulla University of Science and Technology (KSA)	March	2013
1 <sup>st</sup> Workshop on Laboratory Astrophysics (ICE 2013)	February	2013
Gordon Research Conference Molecular Energy Transfers, Ventura	January	2013
Florida International University, Department of Chemistry & Biochemistry	January	2013

## 2012

Max Planck Institute for Astronomy, Heidelberg (Germany)	November	2012
Laboratory Astrophysics Conference, Bonn (Germany)	November	2012
University of Cologne, Department of Physics (Germany)	November	2012
Workshop on Interstellar Matter 2012, Sapporo (Japan)	October	2012
Florida International University, Department of Chemistry & Biochemistry	September	2012
Gordon Research Conference Radiation Chemistry, Proctor Academy	August	2012
Germany Army University, Munich (Germany)	June	2012
University of Bochum, German Chemical Society Presentation (Germany)	June	2012
American Astronomical Society Meeting, Anchorage	June	2012

US Department of Energy Contractor's Meeting, DC	June	2012
Air Force Office of Scientific Research Contractor's Meeting	May	2012
King Abdulaziz City for Science and Technology (KSA)	March	2012
6 <sup>th</sup> Titan Workshop, Florida	March	2012
Institute for Astronomy, UH Manoa	February	2012

## 2011

Departments of Chemistry/Astronomy, UH Hilo	November	2011
Asia Oceania Geosciences Society 2011, Planetary Surfaces (ROC)	August	2011
Asia Oceania Geosciences Society 2011, Planetary Atmospheres (ROC)	August	2011
UH NASA Astrobiology Workshop, Hawaii	June	2011
US Department of Energy Contractor's Meeting, DC	June	2011
Air Force Office of Scientific Research Contractor's Meeting, Pasadena	May	2011
University of Bochum, Department of Chemistry, Bochum, Germany	May	2011
University of Bochum, Department of Chemistry, Bochum, Germany	May	2011
5 <sup>th</sup> Titan Workshop, Kauai	April	2011
King Saud University (KSA)	March	2011
Lorenz Center, University of Leiden (NL), Galactic Cosmic Ray Workshop	March	2011
University of Bochum, Department of Chemistry, Bochum, Germany	March	2011

## 2010

Midwest Astrochemistry Meeting, Illinois	November	2010
Purdue University, Department of Chemistry	November	2010
University of Wisconsin, Department of Chemistry	November	2010
LPL, University of Arizona, Tucson	November	2010
21 <sup>st</sup> International Symposium on Gas Kinetics, Plenary lecture, Leuven (B)	July	2010
4 <sup>th</sup> Titan Workshop, Saint Jacut (F)	June	2010
Faraday Discussion 147 'Chemistry of the Planets', Saint Jacut (F)	June	2010
US Department of Energy Contractor's Meeting, DC	June	2010
Air Force Office of Scientific Research Contractor's Meeting, DC	May	2010
ACS Spring Meeting, San Francisco	March	2010
Lawrence Berkeley National Lab, Berkeley	March	2010
XVII Symposium on Atomic, Cluster, and Surface Physics, Obergurgl (AU)	January	2010
University of Virginia, Department of Chemistry	January	2010
National Radio Astronomy Observatory (NRAO), Virginia	January	2010
Johns Hopkins University, Department of Chemistry	January	2010
University of Bielefeld, Department of Chemistry (D)	January	2010



## Selected Service & Outreach Activities

2016-2017 Senator NatSci Senate (UH)  
2013-2015 Secretary, ACS PHYS Astrochemistry Subdivision  
2012-2013 Founding Chair, ACS PHYS Astrochemistry Subdivision  
2012- UHPA Faculty Representative, College of Natural Sciences  
2012 NatSci Faculty Representative on Graduate Council (UH)  
2012 Tenure and Promotion Review Committees (UH)  
2011 Member Departmental Personal Committee (UH Chemistry)  
2011 UHNAI Astrobiology Winter School 2011  
2010 NASA Review Panel  
2008 NSF Astronomy Review Panel  
2006-2010 UHNAI Astrobiology Laboratory Institute for Instructors (ALII)  
2005-2009 Member Departmental Personal Committee (UH Chemistry)  
2005 NSF Astronomy Review panel  
2004-2009 Committee Member *UHNAI International Visitor Program*  
2004-2010 Mentor Hawaii Space Grant Consortium  
2004-2005 NASA Teacher Workshop *Toward Outer Planetary Systems* (TOPS)  
2004-2007 Mentor of NSF REU Program  
2003- Organizer Physical Chemistry Seminar Series UH  
2003-2005 *Talent Development Hawaii* (Astrochemistry)  
2003 Hawaii Science Teacher Fall Conference Speaker (Punahou)  
2003 Curriculum Development, UH, Graduate Course *Reaction Dynamics & Kinetics*  
2003 Curriculum Development, UH, Graduate Course *Astrochemistry*  
2002- Thesis Committee Member, Chemistry and Institute for Astronomy  
2002-2005 Member College of Natural Sciences Curriculum Committee, UH  
2002-2003 Departmental Secretary, Faculty Meetings UH Chemistry  
2001 Member *Board of Studies* (University of York, UK)

**Teaching Activities**  
**(Germany, TW, UK, USA)**

1. Chemical application of group theory I
2. Chemical application of group theory II
3. Physics of Matter in the Interstellar Medium and Solar System
4. High energy and non-equilibrium physics
5. Physical and chemical evolution of the solar system
6. Chemistry in extraterrestrial environments
7. Astrochemistry
8. Atomic and Molecular Structure
9. Atomic and Molecular States
10. Statistical Thermodynamics
11. Surface Chemistry
12. Introduction to Laboratory Experiments I
13. Liquids and Colloids
14. Mixtures and Solutions
15. Elementary Reaction Mechanisms in Organic Chemistry
16. Introduction to Laboratory Experiments II
17. Atoms, Ions, Quanta
18. Lasers
19. Mixtures and Solutions
20. Vibrational Spectroscopy
21. Molecular Orbitals
22. Photochemistry
23. Electrochemistry
24. General Chemistry
25. Quantum Chemistry
26. Physical & Analytical Seminar
27. Reaction Dynamics and Kinetics
28. Chemical Applications of Spectroscopy
29. Astrochemistry – A Molecular Approach