

Yu Liu

yuliu@umd.edu

Department of Chemistry and Biochemistry \diamond *University of Maryland, College Park*
8051 Regents Drive (1526 Chemistry Building), College Park, MD 20742

Employment

University of Maryland, College Park \diamond **Assistant Professor** \diamond **01/2024 – present**

NIST Boulder \diamond **Postdoctoral researcher** \diamond **12/2020 – 11/2023**

Research advisor: Dr. Chi-Wen Chou

Research topic: quantum state control and precision spectroscopy of single molecular ions

Harvard University \diamond **Postdoctoral researcher** \diamond **09/2020 – 11/2020**

Research advisor: Prof. Kang-Kuen Ni, Department of Chemistry and Chemical Biology

Research topic: state-to-state reaction dynamics of ultracold molecules ([Liu and Ni \[2021\]](#), [Liu et al. \[2021\]](#))

Education

Harvard University \diamond **Ph.D. and A.M. in Physics** \diamond **07/2014 – 08/2020**

Thesis advisor: Prof. Kang-Kuen Ni, Department of Chemistry and Chemical Biology

Thesis: Y. Liu. *Bimolecular Chemistry at Sub-Microkelvin Temperatures*. PhD thesis, Harvard University, 2020.

URL <https://faculty.chemistry.harvard.edu/kni/theses>

Related publications: [Hu* et al. \[2019\]](#), [Liu et al. \[2020a\]](#), [Liu et al. \[2020b\]](#), [Hu* et al. \[2020\]](#)

University of Nevada Las Vegas (UNLV) \diamond **B.S. in physics with minor in math** \diamond **08/2010 – 05/2014**

Degree Honors: *summa cum laude*, Department Honors, University Honors

Thesis advisor: Prof. David Shelton, Department of Physics and Astronomy

Thesis: Y. Liu. The construction and characterization of a magneto-optical trap for rubidium-87 and electromagnetically-induced transparency in rubidium-87 in a vapor cell. 2014. URL https://digitalscholarship.unlv.edu/honors_theses/18

Other research experience

UNLV \diamond **Research assistant** \diamond **09/2012 – 05/2014**

Research advisor: Prof. Clemens Heske, Department of Chemistry

Research topic: electronic structure of amino acids probed through resonant inelastic x-ray scattering of thin films.

UNLV \diamond **Research assistant** \diamond **07/2009 – 09/2012**

Research advisor: Prof. Michael Pravica, Department of Physics and Astronomy

Research topic: x-ray crystallography of materials under high pressure ([Pravica et al. \[2012b, 2013a,b\]](#)); chemical processes in pressurized samples induced by hard x-ray ([Pravica et al. \[2011, 2012a\]](#)).

Teaching experience

Journal publications

*These authors contributed equally.

An up-to-date list of publications can be found at

https://scholar.google.com/citations?hl=en&authuser=1&user=E15f6_QAAAAJ&inst=12445218673517910016

1. M. A. Nichols, Y.-X. Liu, L. Zhu, M.-G. Hu, Y. **Liu**, and K.-K. Ni. Detection of long-lived complexes in ultracold atom-molecule collisions. *Physical Review X*, 12(1):011049, 2022. URL <https://doi.org/10.1103/PhysRevX.12.011049>
2. Y. **Liu** and K.-K. Ni. Bimolecular chemistry in the ultracold regime. *Annual Review of Physical Chemistry*, 73:2022, 2021. URL <https://doi.org/10.1146/annurev-physchem-090419-043244> (invited)
3. Y. **Liu**, M.-G. Hu, M. A. Nichols, D. Yang, D. Xie, H. Guo, and K.-K. Ni. Precision test of statistical dynamics with state-to-state ultracold chemistry. *Nature*, 593(7859):379–384, 2021. URL <https://doi.org/10.1038/s41586-021-03459-6>
4. M.-G. Hu*, Y. **Liu***, M. A. Nichols, L. Zhu, G. Quéméner, O. Dulieu, and K.-K. Ni. Nuclear spin conservation enables state-to-state control of ultracold molecular reactions. *Nature Chemistry*, pages 1–6, 2020. URL <https://doi.org/10.1038/s41557-020-00610-0>
5. Y. **Liu**, M.-G. Hu, M. A. Nichols, D. D. Grimes, T. Karman, H. Guo, and K.-K. Ni. Photo-excitation of long-lived transient intermediates in ultracold reactions. *Nature Physics*, 16(11):1132–1136, 2020b. URL <https://doi.org/10.1038/s41567-020-0968-8>
6. Y. **Liu**, D. D. Grimes, M.-G. Hu, and K.-K. Ni. Probing ultracold chemistry using ion spectrometry. *Physical Chemistry Chemical Physics*, 22(9):4861–4874, 2020a. URL <https://doi.org/10.1039/C9CP07015J> (invited)
7. M.-G. Hu*, Y. **Liu***, D. D. Grimes, Y.-W. Lin, A. H. Gheorghe, R. Vexiau, N. Bouloufa-Maafa, O. Dulieu, T. Rosenband, and K.-K. Ni. Direct observation of bimolecular reactions of ultracold KRb molecules. *Science*, 366(6469):1111–1115, 2019. URL <https://doi.org/10.1126/science.aay9531>
8. G. Quéméner, M.-G. Hu, Y. **Liu**, M. A. Nichols, L. Zhu, and K.-K. Ni. Model for nuclear spin product-state distributions of ultracold chemical reactions in magnetic fields. *Physical Review A*, 104(5):052817, 2021. URL <https://doi.org/10.1103/PhysRevA.104.052817>
9. L. R. Liu, J. T. Zhang, Y. Yu, N. R. Hutzler, Y. **Liu**, T. Rosenband, and K.-K. Ni. Ultracold molecular assembly. *arXiv preprint arXiv:1701.03121*, 2017. URL <https://arxiv.org/abs/1701.03121>
10. J. M. Robinson, Y. **Liu**, and D. P. Shelton. Development and characterization of a magneto-optical trap for rubidium. 2014. URL <http://dx.doi.org/10.15629/6.7.8.7.5.1-1.F-2014.2>
11. M. Pravica, L. Bai, and Y. **Liu**. Hydrazine at high pressure. *Chemical Physics Letters*, 555:115–118, 2013a. URL <https://doi.org/10.1016/j.cplett.2012.10.079>

12. M. Pravica, N. Bhattacharya, Y. **Liu**, J. Robinson, W.-S. Au, T. Mizoguchi, Z. Liu, and Y. Xiao. High pressure infrared and x-ray raman studies of aluminum nitride. *physica status solidi (b)*, 250(4):726–731, 2013b. URL <https://doi.org/10.1002/pssb.201200485>
13. M. Pravica, Y. **Liu**, J. Robinson, N. Velisavljevic, Z. Liu, and M. Galley. A high-pressure far-and mid-infrared study of 1, 1-diamino-2, 2-dinitroethylene. *Journal of Applied Physics*, 111(10):103534, 2012b. URL <https://doi.org/10.1063/1.4722350>
14. M. Pravica, L. Bai, C. Park, Y. **Liu**, M. Galley, J. Robinson, and D. Hatchett. Note: Experiments in hard x-ray chemistry: In situ production of molecular hydrogen and x-ray induced combustion. *Review of Scientific Instruments*, 83(3):036102, 2012a. URL <https://doi.org/10.1063/1.3682336>
15. M. Pravica, L. Bai, C. Park, Y. **Liu**, M. Galley, J. Robinson, and N. Bhattacharya. Note: A novel method for in situ loading of gases via x-ray induced chemistry. *Review of Scientific Instruments*, 82(10):106102, 2011. URL <https://doi.org/10.1063/1.3648062>

Awards and honors

2021 Justin Jankunas Doctoral Dissertation Award finalist (American Physical Society/Division of Chemical Physics)
Bok Center Excellence and Distinction in Teaching Award (Harvard, 09/18)
Purcell Fellowship (Harvard, 08/14 - 08/15)
NASA EPSCoR Undergraduate Research Scholarship (UNLV, 11/11)
Philip J. Cohen Scholarship (UNLV, 08/12 - 05/14)
Linfa R. Wright Scholarship (UNLV, 08/12 - 05/14)
UNLV One-year Tuition Scholarship (UNLV, 08/10 - 08/11)

Talks

(Invited) ACS Western Regional Meeting 2022, “Precision chemistry with ultracold molecules and molecular ions”

(Invited) GRC Molecular Interaction and Dynamics 2022, “Precision test of statistical dynamics with state-to-state ultracold chemistry”, 07/11/2022

APS DAMOP 2022 Annual Meeting, “Quantum state tracking and control of a single molecular ion in a thermal environment”, 06/03/2022

(Invited) Special Seminar at the University of Maryland College Park, “Precision chemistry with ultracold molecules”, 04/14/2022

(Invited) Quantum Information Science Webinar at UNLV, “Precision chemistry with ultracold molecules and molecular ions”, 11/19/2021

(Invited) International Symposium on Molecular Beams (ISMB), “Bimolecular chemistry in the ultracold regime”, 07/01/2021

(Invited) APS March Meeting 2021, “Probing and controlling chemistry at sub-mirokelvin temperatures”, 03/17/2021

Harvard-MIT Center for Ultracold Atoms (CUA) seminar, “Probing and controlling chemistry at sub-mirokelvin temperatures”, 09/15/2020

APS DAMOP 2019 Annual Meeting, “Direct detections of the reaction products and the intermediate complex of an ultracold reaction”, 05/30/2019

ACS 2016 Annual Meeting, “Towards State-to-State Ultracold Chemical Reactions”, 08/21/2016

Nevada Undergraduate Research Symposium (NURS), “X-Ray Induced Decompositions in Energetic Materials Under Variations of Pressure”, 08/14/2012

Nevada Undergraduate Research Symposium (NURS), “Studies of X-Ray Induced Decompositions in Gas-Bearing Materials Under Variations of Pressure”, 10/04/2012