

## Yan Zhou

### *Address*

Department of Physics and Astronomy  
Bigelow Physics Building  
Rooms 153, 155, and 157  
University of Nevada, Las Vegas  
4505 S Maryland Pkwy, Las Vegas, NV, 89154-4002  
Telephone: (702) 895-3084 (office), (702) 895-1729 (lab)  
E-mail: [yan.zhou@unlv.edu](mailto:yan.zhou@unlv.edu)

### *Degrees*

B.S., Physics, Chemistry, Biology, Peking University, Yuanpei college, 2007  
Ph.D., Physical Chemistry, Massachusetts Institute of Technology, 2014

### *Appointments*

Associate Professor, Department of Physics and Astronomy, University of Nevada, Las Vegas,  
2025.7 - now  
Assistant Professor, Department of Physics and Astronomy, University of Nevada, Las Vegas,  
2020.1-2025.6  
Post-Doctorate, Joint Institute for Laboratory Astrophysics, Boulder, 2014.10-2019.10  
Advisors: Eric A. Cornell and Jun Ye  
Research Assistant, Massachusetts Institute of Technology, 2008.6-2014.8  
Advisor: Robert W. Field  
Teaching Assistant, Massachusetts Institute of Technology, 2007.8-2008.6  
Research Assistant, Peking University, 2004.6-2007.6  
Advisor: Xinsheng Zhao

### *Research interests*

Explore new physics beyond the Standard Model using ultracold molecular ions.  
Deceleration of BaF and RaF.  
Ion-radical collisions in the interstellar medium.  
Optical frequency comb spectroscopy.

### *Committees and Honors*

Member, American Chemistry Society, 2022 – present  
Member, American Physics Society, 2013 – present  
Graduate student best poster award, MIT, 2012  
C.P. Chu and Y. Lai Graduate Fellowship at MIT, 2011  
Lester Wolfe Graduate Fellowship at MIT, 2009  
*summa cum laude*, Peking University, 2007

### *Fundings*

DOE Early Career Award, PI (\$875,000, 2025.7 – 2030.7)  
NSF, PI (\$411k, 2025.5 – 2028.5)  
Army Research Office, Co-PI (\$548k, 2024.6 – 2025.6)  
NASA research infrastructure development, PI (\$50k, 2024.8 – 2025.5)  
HDRFS, PI (\$30k, 2024.6-2025.4)  
NSF RII Track-4, PI (\$287k, 2024.1 – 2026.1)  
Army Research Office, Co-PI (\$650k, 2023.2 – 2024.2)  
NSF MRI, PI (\$829k, 2021.9 – 2024.8)  
UNLV FOA award, PI (\$20k, 2021.7 – 2022.6)

### *Students*

Rodrigo Fernandez (PhD, 2021.9 -)  
Jose Mosquera Ojeda (PhD, 2023.9 -)  
Stephanie Letourneau (BS, PhD, 2024.1 -)  
Xuanyi Wu (BS, PhD, 2023.9 -)  
Jiaqi Li (Visiting PhD, 2023.1 -)  
Ian Jones (Visiting PhD, 2025.5 - )

Fabian Caballero Vargas (Visiting student, 2025.5 – 2025.8)  
Balam Sotelo (Visiting student, DOE fellowship, 2025.5 – 2025.8)  
David Valadez (Visiting student, DOE fellowship, 2025.5 – 2025.8)  
Govinda Bhandari (Visitor, 2023.9 -2025.9)  
Bernardo Gutierrez (BS, MS, 2021.9 – 2025.8)  
Tristan Benally (BS, 2024.7 – 2025. 5)  
Justin Friedman (BS, 2024.1 – 2024. 5)  
Trevor Taylor (BS, MS, 2020.1– 2024.5)  
Timothy Chung (MS, 2021.9 – 2023.7)  
Casey Johnson (BS, 2022.9 – 2023.12)  
Erick Serrano (BS, 2022.12 – 2023.5)  
Thomas Mcpartland (BS, 2022.12 – 2023.5)  
Johnil Kim (BS, 2021.8 – 2021.12)  
Kaione Daniels (BS, 2021.8 – 2021.12)  
Weilun Tang (BS, 2021.1 – 2022.5)  
Matthew Cooper (Visitor, 2020.8 – 2021.4)  
Antonio Bernadino (BS, 2020.1 – 2021.5)  
Oliver Walton (BS, 2020.1 – 2021.5)  
Thomas Conibear (BS, 2020.1 – 2020.12)  
Jacob Clark (BS, 2020.1 – 2020.12)  
Jeremiah Foley (BS, 2020.1 – 2020.12)

## Publications

1. Ojeda, J. M., Li, J., Garcia Ruiz, R. F., Field, R. W., Zhou, Y. Lifetime Calculations of High- $m$  Rydberg States in the Presence of a DC Electric Field, *In final preparation*.
2. Zhou, Y. Advancing ion-neutral collision studies: a high-resolution method with extensive energy range. *In final preparation*.
3. Li, J., Fernandez, R., Gutierrez, B., Pedersen, J., Zhou, Y. Advancing molecular spectroscopy efficiency with extensive parallelism. *Metrology*, 4, 736-764 (2024).
4. Wilkins, S. G., et al. Ionization potential of radium monofluoride. *Physical Review Letter*, submitted, arXiv: 2408.14673 (2024).
5. Zhou, Y., Island, J. O., Grau, M. Quantum logic control and precision measurements of molecular ions in a ring trap--a new approach for testing fundamental symmetries. *Physical Review A*, 109, 033107 (2024).
6. Li, J., Mcpartland, T., Gutierrez, B., Pedersen, J., Zhou, Y. Additive manufacturing for ultra-high vacuum components: Leveraging photo-polymer resin technologies. *Vacuum*, 220, 112769 (2024).
7. Acharya, B., et al. Fundamental Symmetries, Neutrons, and Neutrinos (FSNN). *Whitepaper for the 2023 NSAC Long Range Plan* (2023).
8. Ng, K. B., Zhou, Y., Cheng, L., Schlossberger, N., Park, S. Y., Roussy, T. S., Caldwell, L., Shagam, Y., Vigil, A. J., Cornell, E. A., Ye, J. Spectroscopy on the electron-electric-dipole-moment-sensitive states of  $\text{ThF}^+$ , *Physical Review A*, 105, 022823 (2022).
9. Alarcon, R., et al. Electric dipole moments and the search for new physics. *arXiv:2203.08103* (2022).
10. Roussy, T. S., Palken, D.A., Cairncross, W. B., Brubaker, B. M., Gresh, D. N., Grau, M., Cossel, K. C., Ng, K., Shagam, Y., Zhou, Y., Flambaum, V. V., Lehnert, K. W., Ye, J., Cornell, E. A. Experimental constraint on axion-like particle coupling over seven orders of magnitude in mass, *Physical Review Letters*, 126, 171301 (2021).
11. Shagam, Y., Cairncross, W. B., Roussy, T. S., Zhou, Y., Ng, K., Gresh, D. N., Grogan, T., Ye, J., Cornell, E. A. Continuous temporal detection combined with time-gated imaging: complementary data sets from a single shot. *Journal of Molecular Spectroscopy*, 368, 111257 (2020).
12. Zhou, Y., Shagam, Y., Cairncross, B. W., Ng, K. B., Roussy, T. S., Grogan, T., Zelevinsky, T., Ye, J., Cornell, E. A. Second-scale coherence measured at the projection noise limit with hundreds of molecular ions. *Physical Review Letters*, 124, 053201 (2020).
13. Zhou, Y., Ng, K. B., Cheng L., Gresh, D. N., Field, R.W., Ye, J., Cornell, E. A. Visible and Ultraviolet Laser Spectroscopy of  $\text{ThF}$ . *Journal of Molecular Spectroscopy*, 358, 1 (2019).
14. Cairncross, W. B., Gresh, D. N., Grau, M., Cossel, K. C., Roussy, T. S., Ni, Y., Zhou, Y., Ye, J., Cornell, E. A. Precision Measurement of the Electron's Electric Dipole Moment Using Trapped Molecular Ions. *Physical Review Letters*, 119, 153001 (2017).
15. Grimes, D. D., Coy, S. L., Barnum, T. J., Zhou, Y., Yelin, S. F., Field, R. W. Direct single-shot observation of millimeter-wave superradiance in Rydberg-Rydberg transitions. *Physical Review A*, 95, 043818 (2017).

16. Grimes, D. D., Barnum, T. J., Zhou, Y., Colombo, A. P., Field, R. W. Coherent laser-millimeter-wave interactions en route to coherent population transfer. *Journal of Chemical Physics*, 147, 144201 (2017).
17. Gresh, D. N., Cossel, K. C., Zhou, Y., Ye, J., Cornell, E. A. Broadband velocity modulation spectroscopy of ThF<sup>+</sup> for use in a measurement of the electron electric dipole moment. *Journal of Molecular Spectroscopy*, 319, 1 (2016).
18. Coy, S. L., Grimes, D. D., Zhou, Y., Field, R. W., Wong, B. M. Electric potential invariants and ions-in-molecules effective potentials for molecular Rydberg states. *Journal of Chemical Physics*, 145, 234301 (2016).
19. Zhou, Y., Grimes, D. D., Barnum, T. J., Patterson, D., Coy, S. L., Klein, E., Muentner, J. S., Field, R. W. Direct detection of Rydberg-Rydberg millimeter-wave transitions in a buffer gas cooled molecular beam. *Chemical Physics Letters*, 640, 124 (2015).
20. Velian, A., Nava, M., Temprado, M., Zhou, Y., Field, R. W., and Cummins, C. C. A Retro Diels–Alder Route to Diphosphorus Chemistry: Molecular Precursor Synthesis, Kinetics of P<sub>2</sub> Transfer to 1,3-Dienes, and Detection of P<sub>2</sub> by Molecular Beam Mass Spectrometry. *Journal of the American Chemical Society*, 136, 13586 (2014).
21. Colombo, A. P., Zhou, Y., Prozument, K., Coy, S. L., Field, R. W. Chirped-pulse millimeter-wave spectroscopy: Spectrum, dynamics, and manipulation of Rydberg–Rydberg transitions. *Journal of Chemical Physics*, 138, 014301 (2013).
22. Zhou, Y. Cooperative effects in a dense Rydberg gas. *Molecular Physics*, 110, 1909 (2012).
23. Prozument, K., Colombo, A., Zhou, Y., Park, G., Petrović, V., Coy, S., Field, R. W. Chirped-Pulse Millimeter-Wave Spectroscopy of Rydberg-Rydberg Transitions. *Physical Review Letters*, 107, 143001 (2011).
24. Fleischer, S., Zhou, Y., Field, R. W., Nelson, K. A. Molecular Orientation and Alignment by Intense Single-Cycle THz Pulses. *Physical Review Letters*, 107, 163603 (2011).
25. Chen, X., Zhou, Y., Qu, P., Zhao, X. Base-by-base dynamics in DNA hybridization probed by fluorescence correlation spectroscopy. *Journal of the American Chemical Society*, 130, 16947 (2008).

#### Invited talks

1. Rydberg states via CPmmW Spectroscopy. (2012). *Workshop of Heavy Rydberg Physics, at the Institute for Theoretical, Atomic and Molecular and Optical Physics (ITAMP), Harvard*
2. Rydberg states via CPmmW Spectroscopy. (2012). *AMO Physics Symposium, JILA, CU Boulder*
3. Rydberg states via CPmmW Spectroscopy. (2013). *Physics Symposium, Peking University, China*
4. Direct observation of Rydberg-Rydberg transitions via CPmmW spectroscopy. (2014). *Modern Optics Symposium, MIT*
5. Direct observation of Rydberg-Rydberg transitions via CPmmW spectroscopy. (2014). *AMO Physics Symposium, Harvard University*
6. Direct observation of Rydberg-Rydberg transitions via CPmmW spectroscopy. (2014). *Physics Symposium, Wesleyan University*

7. Progress of JILA eEDM experiment with trapped  $\text{HfF}^+$  ions. (2017) *8th International conference on Fundamental Physics Using Atoms*, Kyoto University, Japan
8. A precision measurement of the electron's Electric Dipole Moment using trapped molecular ions. (2018). *Cold and controlled molecules and ions (CCMI)*, University of Georgia, GA
9. A precision measurement of the electron's electric dipole moment using trapped molecular ions. (2019). *The 2nd North American Conference on Trapped Ions (NACTI)*, University of Maryland in College Park, MD
10. Playing with molecular ions, from precision measurement to cold chemistry. (2019). *UNLV-QLCI workshop*, Las Vegas, NV
11. Playing with molecular ions – from fundamental physics to cold chemistry. (2020) *Physics Colloquium*, Idaho State University.
12. Testing fundamental symmetries by precision measurements using ultracold polar molecular ions. (2022) *Nuclear physics seminar*, Michigan State University.
13. Quantum logic control and precision spectroscopy of molecular ions in a ring trap. (2022) *FRIB workshop*, Michigan State University.
14. Playing with molecular ions – from fundamental physics to cold chemistry. (2022) *Cold Molecule Symposium, ACS Western meeting*.
15. Playing with molecular ions – from fundamental physics to cold chemistry. (2022) *Gorden Research Conference*.
16. Playing with molecular ions – from fundamental physics to cold chemistry. (2023) *Chemistry colloquium*, Texas Tech University.
17. Development of Quantum InterConnects – a key step towards quantum advantage. (2023) *qCISE workshop*, NSF headquarters.
18. Testing fundamental symmetries by precision measurements using ultracold polar molecular ions. (2023) *CUA seminar*, MIT.
19. Precision measurements of molecular ions in a ring trap - a new approach for testing fundamental symmetries. (2024) *CFP colloquium*, Northwestern University.
20. Precision measurements of molecular ions in a ring trap - a new approach for testing fundamental symmetries. (2024) *ECT workshop*, Trento, Italy.
21. Precision measurements of molecular ions in a ring trap - a new approach for testing fundamental symmetries. (2024) *INT workshop*, University of Washington, Seattle.
22. Precision measurements of molecular ions in a ring trap - a new approach for testing fundamental symmetries. (2024) *Ion storage group seminar*, NIST, Boulder.
23. Precision spectroscopy of heavy molecules. (2024) *TRIUMF*, Vancouver, Canada.
24. Toward unravelling nuclear structure by precision spectroscopy. (2024) *CAARI-SNEAP*, Fort Worth, Texas.
25. Precision measurements of molecular ions in a ring trap - a new approach for testing fundamental symmetries. (2024) *Physics colloquium*, Jilin University, China.

26. Precision measurements of molecular ions in a ring trap - a new approach for testing fundamental symmetries. (2024) *JILA seminar*, University of Colorado, Boulder.
27. Molecular spectroscopy on nuclear physics and high-energy physics. (2025) *Fundamental Symmetry workshop*, CERN, Geneva, Switzerland.
28. Explore New Physics Beyond the Standard Model by Precision Spectroscopy of Heavy Molecules. (2025) *ESNT Workshop*, Saclay, France.
29. Explore New Physics Beyond the Standard Model by Precision Spectroscopy of Heavy Molecules. (2025) *Workshop on Precision Measurements with Radioisotopes*, TAMU, Texas.