

DR. LUYAO ZOU

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Education and Professional Experience

Chaire Professeur Junoir (CPJ)		
LPCA, Université du Littoral Côte d'Opale, France		19/12/2022 – <i>present</i>
Post-doctoral researcher		
Laboratoire LISA, Université Paris-Est Créteil, France	01/10/2022 – 18/12/2022	
Marie Skłodowska-Curie Individual Post-doctoral Fellow		
Laboratoire PhLAM, Université de Lille, France	01/09/2020 – 31/08/2022	
Post-doctoral researcher		
Laboratoire PhLAM, Université de Lille, France	11/02/2019 – 31/08/2020	
Operation specialist on natural science		
Zhihu.com (social media platform), Beijing, China	28/06/2017 – 16/07/2018	
Doctor of Philosophy, Chemistry		
Emory University, Atlanta, USA	15/08/2012 – 08/05/2017	
Bachelor of Science, Chemistry		
Fudan University, Shanghai, China	01/09/2008 – 01/07/2012	

Research

CPJ Research

- Development of THz spectroscopic instrumentation and continuous supersonic expansion apparatus.
- Rotational spectroscopy of atmospheric organic molecules.
- Gas-phase reaction mechanism of atmospheric oxidation products.
- Spectral analysis and software development.

Post-doctoral Research

Advisor: *Dr. H. V. Lam Nguyen*

- Software development of a hybrid microwave spectrometer coupling chirped-pulse and Fourier-transform microwave cavity.
- Assist team management on informatics and configure a quantum chemical calculation station for the team.

Marie Skłodowska-Curie Individual Fellowship

Advisor: *Dr. Laurent Margulès*

- Development of a pulsed discharge supersonic expansion apparatus compatible with (sub)millimeter chirped pulse spectrometer.
- Measurement and analysis of the rotational spectra and large amplitude motion of astrophysical molecules: formaldoxime (CH_2NOH), nitrosomethane (CH_3NO), 2-propanimine ($(\text{CH}_3)_2\text{CNH}$).
- Measurement and analysis of the rotational spectra of astrophysical aminogen radicals.

Post-doctoral Research

Advisor: *Dr. Roman A. Motiyenko*

- Development of a sensitive (sub)millimeter chirped pulse spectrometer based on direct digital synthesis.
- Measurement and analysis of the rotational spectra and large amplitude motion of atmospheric pollutant trifluoroacetic acid (CF_3COOH).

Dissertation Research

Advisor: *Dr. Susanna L. Widicus Weaver*

- Development of a fast spectral acquisition technique, and installation of a multipass (sub)millimeter-wave spectrometer.
- Measurement and analysis the rotational spectra of unstable molecules: HO₃ radical and Ar-H₂O complex.
- Development of a multi-molecule, multi-component automated spectral line-fitting program “GOBASIC”.
- Analysis of molecular composition of 30 star-forming regions using broadband astronomical line surveys and GOBASIC.

Teaching, Mentoring, and Other Experiences

Teaching

Year	Institute	Subject	Level
since 2023	ULCO	Instructor, Electromagnetism Laboratory	CP2 ^[1]
since 2023	ULCO	Instructor, Molecular Spectroscopy and Laboratory	GEE2 ^[2]
2023	ULCO	Instructor, Interaction of Light and Matter	CP2
2022	UPEC	Teaching Assistant, Kinetics and Reactivity Laboratory	M2 ^[3]
2014–2015	Emory	Teaching Assistant, Physical Chemistry Laboratory	junior
2013–2014	Emory	Teaching Assistant, Physical Chemistry Laboratory	junior
2012–2013	Emory	Teaching Assistant, General Chemistry Laboratory	freshmen

¹ CP2: 2nd year engineering preparatory cycle

² GEE2: 2nd year engineering cycle major in energy and environment management

³ M2: 2nd year master major in chemistry

Mentoring, ULCO

- Co-supervisor (70%) to 1 PhD student of ULCO (2024–2027).
- Co-supervisor (50%) to 1 PhD student of a co-tutorship between ULCO and Mohammed V University in Rabat (Morocco) (2024–2027).
- Supervisor to 1 post-doc researcher of ULCO (2024–2025).
- Supervisor of 1 research intern of master 2 of University of Lille (5 months, 2024).

Mentoring, UPEC and Emory

- Mentoring 1 PhD students at Université Paris-Est Créteil (2022).
- Mentoring 1 PhD student and 1 master student at Emory University (2014–2017)
- Mentoring high-school interns for short term projects at Emory University and Université de Lille (2 weeks – 6 months).

Science Communication

- Book translator (English to Chinese). 2018–2019
- Magazine column writer, *Science et Vie* (Chinese ed.) 2019–2020
- TED subtitle translator 2016

Funding & Fellowship

Quality Research Bonus, ULCO

PI: Luyao Zou

Title: Spectroscopie de l'Oxydation Atmosphérique des Composés organiques volatils dans une chambre d'expansion du jet continu couplée à une chambre de simulation atmosphérique (Spec-

troscopy of the atmospheric oxydation of volatile organic compounds in a jet expansion chamber coupled with an atmospheric simulation chamber)

Agency: ULCO (internal fund)

Performance period: 01/01/2024–31/12/2024

Total budget: € 10,000.00

Chaire Professeur Junior Start-up Fund

PI: Luyao Zou

Title: Spectroscopie Terahertz Appliquee a la Recherche sur le climat et la qualite de l'air (THz spectroscopy applied to research in climate and air quality)

Agency: ANR (French National Agency for Research)

Performance period: 19/12/2022 – 18/12/2028

Total budget: € 200,000.00

Marie Skłodowska-Curie Individual Fellowship

PI: Luyao Zou

Title: Chemistry and structure of aminogen radicals using chirped-pulse Fourier transform (sub)millimeter rotational spectroscopy

Agency: European Commission Horizon 2020

Grant agreement ID: 894508

Performance period: 01/09/2020 – 31/08/2022

Total budget: € 196,707.84

Honors & Awards

- Travel Award, Interstellar Shock School, France, Jun. 2022.
- Osborne R. Quayle Student Achievement Award Department of Chemistry, Emory University (26/08/2016)
- Chun-Tsung Scholar Fudan University Undergraduate Research Opportunity Program (26/06/2012)

Professional Service

- Rao Prize judge, 74th & 75st *International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA
- Assistant session chair, 71st *International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, 2016.

Peer-reviewed Publications

17. L. Zou, A. Dudaryonok, F. Rohart, L. Margulès, N. Lavrentieva, J. Buldyreva, “Extended measurements and calculations of CH₃C¹⁴N–N₂ rotational lineshape parameters”, *Icarus*, **2024**, [418](#), [116149](#).
16. A. Roucou, X. Wang, J. Bruckhuisen, M. Roca, C. Bracquart, R. Blanchart, L. Zou, Q. Gou, A. Cuisset, G. Dhont, “A biogenic organic molecule involved in the formation of secondary organic aerosols: Microwave and millimeter-wave spectroscopy of 3-methylcatechol backed by quantum chemistry”, *Journal of Molecular Structure*, **2024**, [1308](#), [138048](#).
15. L. Zou, J.-C. Guillemin, A. Belloche, J. K. Jørgensen, L. Margulès, R. A. Motiyenko, P. Groner, “Millimeter-wave spectrum of 2-propanimine”, *MNRAS*, **2023**, [520](#), [4089](#).
14. L. Zou, J.-C. Guillemin, R. A. Motiyenko, L. Margulès, “Millimeter- and submillimeter-wave spectrum of formaldoxime (CH₂NOH)”, *A&A*, **2021**, [649](#), [A60](#).

13. [L. Zou](#) and R. A. Motiyenko, “Window Function for Chirped Pulse Spectroscopy with Enhanced Signal-to-noise Ratio and Lineshape Correction”, *J. Quant. Spectrosc. Radiat. Transf.*, **2021**, [268](#), [107608](#).
12. J. Cernicharo, C. Cabezas, S. Bailleux, L. Margulès, R. Motiyenko, [L. Zou](#), Y. Endo, C. Bermúdez, M. Agúndez, N. Marcelino, B. Lefloch, B. Tercero, P. de Vicente, “Discovery of the acetyl cation, CH_3CO^+ , in space and in the laboratory”, *A&A*, **2021**, [646](#), [L7](#).
11. [L. Zou](#), R. A. Motiyenko, L. Margulès, E. A. Alekseev, “Millimeter-wave Emission Spectrometer Based on Direct Digital Synthesis”, *Rev. Sci. Instrum.*, **2020**, [91](#), [063104](#).
10. [L. Zou](#) and S. L. Widicus Weaver, “Observation and Analysis of Interstellar Acetone in GAL 31.41+0.31, GAL 034.3+00.2, GAL 10.47+00.03”, *Astrophys. J.*, **2017**, [849](#), [139](#).
9. S. L. Widicus Weaver, J. C. Laas, [L. Zou](#), J. A. Kroll, M. L. Rad, B. M. Hays, J. L. Sanders, D. C. Lis, T. N. Cross, N. Wehres, B. A. McGuire, M. C. Sumner, “Deep, Broadband Spectral Line Surveys of Molecule-rich Interstellar Clouds”, *Astrophys. J. Suppl. Ser.*, **2017**, [232](#), [3](#).
8. M. C. McCarthy, [L. Zou](#), M.-A. Martin-Drumel, “To kink or not: A search for long-chain cumulenones using microwave spectral taxonomy”, *J. Chem. Phys.*, **2017**, [146](#), [154301](#).
7. AJ Mesko, [L. Zou](#), P. B. Carroll, S. L. Widicus Weaver, “Millimeter and Submillimeter Spectrum of Propylene Oxide”, *J. Mol. Spectrosc.*, **2017**, [335](#), [49](#).
6. [L. Zou](#) and S. L. Widicus Weaver, “Direct Measurement of Additional Ar–H₂O Vibration-Rotation-Tunneling Bands in the Millimeter-Submillimeter Range”, *J. Mol. Spectrosc.*, **2016**, [324](#), [12](#).
5. [L. Zou](#), B. M. Hays, S. L. Widicus Weaver, “Weakly Bound Clusters in Astrochemistry? Millimeter and Sub-millimeter Spectroscopy of trans–HO₃ and Comparison to Astronomical Observations”, *J. Phys. Chem. A*, **2016**, [120](#), [657](#).
4. M. L. Rad*, [L. Zou](#)*, J. L. Sanders, S. L. Widicus Weaver, “Global Optimization and Broadband Analysis Software for Interstellar Chemistry (GOBASIC)”, *A&A*, **2016**, [585](#), [A23](#). (Co-first author)
3. N. Wehres, T. N. Cross, M. L. Rad, [L. Zou](#), A. Carroll, S. L. Widicus Weaver, “A hollow-cathode THz spectrometer for the study of astrophysical ions and radicals: Benchmarking with N₂H⁺ and extended measurements for N₂D⁺”, *J. Mol. Spectrosc.*, **2014**, [306](#), [1](#).
2. [L. Zou](#), Y. Cui, W. Dai, “Highly Efficient AuTiO₂ Catalyst for One-pot Conversion of Nitrobenzene to p-Aminophenol in Water Media”, *Chin. J. Chem.*, **2014**, [32](#), [257](#).
1. B. Ma, J. Guo, [L. Zou](#), W. Dai, K. Fan, “AgAgCl@Cotton-fabric: A Highly Stable and Easy-recycling Plasmonic Photocatalyst under Visible Light Irradiation”, *Chin. J. Chem.*, **2011**, [29](#), [857](#).

Conferences

Invited Talks and Seminars

3. Invited seminar at *LPCA UR 4493, Université du Littoral Côte d’Opale*, Dunkerque, France, “Development of millimeter wave spectrometers for the study of astrophysical molecules” (2022).
2. Invited seminar at *LISA UMR 7583 CNRS, Université Paris-Est Créteil*, Créteil, France, “Development of millimeter wave absorption and emission spectrometers for the study of astrophysical and atmospheric molecules and radicals” (2021).
1. “Millimeter-wave Emission Spectrometer Based on Direct Digital Synthesis and Zero-biased Detectors”, *Journées de Spectroscopie Moléculaire*, Rennes, France (2021).

Contributed Talks

19. R. A. Motiyenko, P. Gyawali, L. Margulès, E. A. Alekseev, [L. Zou](#), I. Kleiner, “The analysis of torsional and inversion motions in weakly bounded ammonia-water complex”, *77th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2024**.
18. O. Pirali, R. Chahbazian, M.-A. Martin-Drumel, L. H. Coudert, [L. Zou](#), R. A. Motiyenko, L. Margulès, “The electron spin-torsion coupling for internal rotation in open-shell molecules”, *77th*

International Symposium on Molecular Spectroscopy, Champaign–Urbana, USA, **2024**.

17. L. Zou, I. Kleiner, L. Margulès, “Global treatment of torsional excited states of non-equivalent CH₃ tops: test with 2-propanimine”, *The 28th Colloquium on High Resolution Molecular Spectroscopy*, **2023** Dijon, France.
16. P. Gyawali, R. A. Motiyenko, L. Margulès, L. Zou, I. Kleiner, “Millimeter-wave spectroscopy of ammonia-water weakly bounded complex”, *76th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2023**.
15. O. Pirali, R. Chahbazian, M.-A. Martin-Drumel, L. H. Coudert, L. Zou, R. A. Motiyenko, L. Margulès, “Analysis of the open-shell CH₃CO radical: internal rotation, spin-rotation, and hyperfine structure”, *76th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2023**.
14. C. E. Walker, L. Zou, S. Wang, D. C. Lis, S. L. Widicus Weaver, “Chemical inventories of molecular clouds revealed by Herschel HIFI spectral line surveys”, *76th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2023**.
13. L. Zou, L. Margulès, R. A. Motiyenko, J.-C. Guillemin, A. Belloche, J. Jørgensen, “Millimeter-wave spectrum of 2-propanimine and its search in the interstellar medium”, *75th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2022**.
12. L. Margulès, L. Zou, R. A. Motiyenko, J.-C. Guillemin, “Re-investigation of the cyanoacetaldehyde (NCCH₂CHO) rotational spectrum”, *75th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2022**.
11. L. Margulès, L. Zou, R. A. Motiyenko, “Submillimeter wave study of nitrosomethane (CH₃NO)”, *75th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2022**.
10. L. Zou, R. A. Motiyenko, L. Marguès, “Analysis of the low torsional barrier of a heavy C_{3v} top: the case of trifluoroacetic acid (CF₃COOH)”, *The 26th Colloquium on High Resolution Molecular Spectroscopy*, **2021**.
9. L. Zou, L. Marguès, J.-C. Guillemin, R. A. Motiyenko, “Submillimeter wave investigation of two formamide isomers: formaldoxime (CH₂NOH) and nitrosomethane (CH₃NO)”, *Virtual International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2021**.
8. L. Zou, R. A. Motiyenko, L. Marguès, “Accurate torsional barrier height of trifluoroacetic acid”, *Virtual International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2021**.
7. L. Zou, S. Bailleux, L. Margulès, R. A. Motiyenko, “Searching astrophysical ions with DDS-based chirped pulse millimeter wave spectrometer”, *The 5th Asian Workshop on Molecular Spectroscopy*, Chongqing–Hsinchu–Kyoto–Ulsan, **2021**.
6. L. Zou, R. A. Motiyenko, E. A. Alekseev, L. Margulès, “Development and Performance of Lille’s Fourier Transform Millimeter-wave Spectrometer”, *74th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2019**.
5. K. Roenitz, L. Zou, S. L. Widicus Weaver, “Extending the Millimeter-Submillimeter Spectrum of Protonated Formaldehyde”, *72nd International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2017**.
4. L. Zou and S. L. Widicus Weaver, “Millimeter/Submillimeter Spectra of Weakly-bound Clusters”, *71st International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2016**.
3. L. Zou, B. M. Hays, S. L. Widicus Weaver, “Re-evaluation of HO₃ Structure Using Millimeter-submillimeter Spectroscopy”, *70th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2015**.
2. L. Zou, S. L. Widicus Weaver, M. L. Rad, J. L. Sanders, “Global Optimization and Broadband Analysis Software for Interstellar Chemistry (GOBASIC)”, *249th ACS National Meeting and Exposition*, Denver, USA, **2015**.
1. L. Zou and S. L. Widicus Weaver, “Millimeter and Submillimeter Spectroscopic Studies of HO₃”, *69th International Symposium on Molecular Spectroscopy*, Champaign–Urbana, USA, **2014**.

8. P. Gyawali, R. A. Motiyenko, L. Zou, I. Kleiner, “Millimeter-wave spectroscopy of ammonia-water weakly bounded complex”, *The 28th Colloquium on High Resolution Molecular Spectroscopy*, Dijon, France, **2023**.
7. L. H. Coudert, O. Pirali, R. Chahbazian, M.-A. Martin-Drumel, L. Zou, R. A. Motiyenko, L. Margulès, “Electron spin-torsion and spin-rotation effects in the open-shell CH₃CO radical”, *The 28th Colloquium on High Resolution Molecular Spectroscopy*, Dijon, France, **2023**.
6. F. Rohart, A. Dudaryonok, L. Zou, L. Margulès, N. Lavrentieva, J. Buldyreva, “Extensive investigation of room-temperature CH₃C¹⁴N–N₂ pressure-broadening parameters in the 180–1400 GHz range”, *The 28th Colloquium on High Resolution Molecular Spectroscopy*, Dijon, France, **2023**.
5. L. Zou, J.-C. Guillemin, A. Belloche, J. Jørgensen, L. Margulès, R. A. Motiyenko, P. Groner, “Millimeter-wave spectrum of 2-propanimine”, *Physique et Chimie du Milieu Interstellaire*, Paris, France, **2022**.
4. L. Zou, A. Dudaryonok, L. Margulès, F. Rohart, N. Lavrentieva, J. Buldyreva, “Experimental and theoretical studies of N₂-pressure broadening parameters for CH₃C¹⁴N rotational transitions”, *The combined 15th ASA and 16th HITRAN Conference*, Reims, France, **2022**.
3. L. Zou, R. A. Motiyenko, L. Margulès, E. A. Alekseev, “Development and Performance of Lille’s Fourier Transform Millimeter-wave Spectrometer for Atmospheric and Interstellar Molecules”, *The 26th Colloquium on High Resolution Molecular Spectroscopy*, Dijon, France, **2019**.
2. L. Zou, R. A. Motiyenko, E. A. Alekseev, L. Margulès, “Development and performance of Fourier Transform Millimeter-wave Spectrometer: Application to Atmospheric Radicals”, *CLIMIBIO 2^{ème} Journée Scientifique*, Villeneuve d’Ascq, France, **2019**.
1. L. Zou, B. M. Hays, S. L. Widicus Weaver, “Rotational Spectroscopy of Weakly-bound Molecules in Astrochemistry”, *STEM Research and Career Symposium*, Atlanta, USA, **2016**.

Science Communication Works

3. Erwin Schrödinger, *What is Life? & Mind and Matter*, ed. 1967, London: Cambridge University Press. Translated by Luyao Zou in Chinese, 2019, Nanjing: Phoenix Science Press, ISBN 9787571305567.
2. Colin Barras, *Unbelievable Science*, 2018, New York: Sterling Publishing. Translated by Luyao Zou in Chinese, 2018, Beijing: CITIC Press, ISBN 9787521708646.
1. Luyao Zou, *Your first guide for academic writing in English* (in Chinese), 2017, Hangzhou: Zhejiang Publishing & Media Co. Ltd., ASIN: B074V5C9P4.