Jialu Li (李佳璐)

Curriculum Vitae

Department of Astronomy
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RESEARCH INTERESTS

I study the formation of massive protostars in their deeply embedded, hot core phases from an observer's perspective. I use high-spectral resolution mid-infrared spectroscopy and submm interferometry to characterize molecular gas in the innermost regions of massive protostellar systems, particularly the disks. I am also interested in investigating the associated astrochemical processes, and how these results can serve as benchmarks for understanding hot corinos around low-mass protostars, which will evolve into protoplanetary disks.

EMPLOYMENT

University of Maryland, College Park
Post-Doctoral Associate — May 2023 - Present

EDUCATION

University of Maryland, College Park
Ph.D. in Astronomy — May 2023
Advisors: Prof. Andrew Harris and Prof. A.G.G.M. Tielens
Thesis: *Molecular Spectroscopy of Star-Forming Regions: Cool and Hot, Close and Far*
M.S. in Astronomy — Dec. 2018

University of Science and Technology of China
B.Sc. in Astronomy — Jun. 2016

University of Vienna
Exchange student — Sep. 2014 – Jan. 2015

PUBLICATIONS

(1) Refereed journal articles, primary author:

1. "On the Interpretation of Mid-Infrared Absorption Lines of Gas Phase H_2O as Observed by JWST/MIRI"
Li, J., Boogert, A., and Tielens, A. G. G. M., ApJS, 273, 32 (2024)

2. "Argus/GBT Observations of Molecular Gas in the Inner Regions of IC342"
Li, J., Harris, A. I., Rosolowsky, E., Kepley, A., Frayer, D., Bolatto, A., Leroy, A., Meyer, J., Church, S., Gundersen, J., Cleary, K., and the DEGAS team, ApJ, 963, 117 (2024)

3. "Dynamics in Star-forming Cores (DiSCo): Project Overview and the First Look toward the B1 and NGC 1333 Regions in Perseus"
Chen, C.-Y., Friesen, R., **Li, J.**, Schmiedeke, A., Frayer, D., Li, Z.-Y., Tobin, J., Looney, L. W., Offner, S., Mundy, L. G., Harris, A. I., Church, S., Ostriker, E. C., Pineda, J. E., Hsieh, T.-H., Lam K. H., MNRAS, 527, 10279 (2023)

4. "High-resolution SOFIA/EXES Spectroscopy of Water Absorption Lines in the Massive Young Binary W3 IRS 5"
   Li, J., Boogert, A., Barr, A. G., DeWitt, C., Rashman, M., Neufeld, D., Indriolo, N., Pendleton, Y., Montiel, E., Richter, M., Chiar, J., Tielens, A. G. G. M., ApJ, 953, 103 (2023)

5. "Surveying the Inner Structure of Massive Young Stellar Objects in the L Band"
   Barr, A. G., **Li, J.**, Boogert, A., Lee, A., DeWitt, C. N., and Tielens, A. G. G. M., A&A, 666, A26 (2022)

6. "M-band High-Resolution Spectroscopy towards Massive Young Stellar Object W3 IRS 5 with iSHELL/IRTF"
   Li, J., Boogert, A., Barr, A. G., and Tielens, A. G. G. M., ApJ, 935, 161 (2022)

7. "Infrared H_2O Absorption in Circumstellar Disks of Massive Protostars at High Spectral Resolution: Full spectral survey results of AFGL 2591 and AFGL 2136"
   Barr, A. G., Boogert, A., **Li, J.**, DeWitt, C. N., Montiel, E., Richter, M. J., Indriolo, N., Pendleton, Y., Chiar, J., and Tielens, A. G. G. M., ApJ, 935, 165 (2021)

(2) Refereed journal articles, others:

1. "Discovery of high-quality daytime seeing windows at the Antarctic Taishan station"
   Tian, Q., Jiang, P., Jin, X., **Li, J.**, Pei, C., Du, F., Li, Z., Li, X., Chen, H., Ji, T., Shi, X., Zhang, S., Yang, C., and Zhou, H., MNRAS, 493(4), 5648 (2020)

2. "Investigating the complex velocity structures within dense molecular cloud cores with GBT-Argus"
   Chen, C.-Y., Storm, S., Li, Z.-Y., Mundy, L. G., Frayer, D., **Li, J.**, Church, S., Friesen, R., Harris, A. I., Looney, L. W., Offner, S., Ostriker, E. C., Pineda, J. E., Tobin, J., Chen, H.-H., MNRAS, 490, 527 (2019)

3. "Far-infrared metallicity diagnostics: application to local ultraluminous infrared galaxies"
   Pereira-Santaella, M., Rigopoulou, D., Farrah, D., Lebouteiller, V., & **Li, J.**, MNRAS, 470, 1218 (2017)

(3) Journal articles, in preparation:

1. "Circumstellar Dynamics in a Binary Massive Protostellar System: SMA Insights from HCN Vibrational Excited Lines and Sulfur Molecule"
   Li, J., Boogert, A., Williams, J., and Tielens, A. G. G. M., ApJ submission: 2024 Sep.

2. "DEGAS DR1 Paper"
   Kepley, A., Rosolowsky, E., **Li, J.**, Harris, A. I., Leroy, A., Song, Y.-Q., Bolatto, A., Meyer, J., Gundersen, J., and the DEGAS team, ApJ submission: 2024

(4) Memorandum:

1. GBT memo, in prep: "Scanning Strategy Analysis of Argus on the GBT"
   Li, J., et al. 2022, link.

2. GBT memo #302: "Calibration of Argus and the 4mm Receiver on the GBT"
   Frayer, D. T., Maddalena, R. J., White, S., Galen, W., Kepley, A., **Li, J.**, Harris, A. I., arXiv e-prints, arXiv:1906.02307 (2019)

SCIENTIFIC PRESENTATIONS

Contributed Conferences Talks

Apr. 2024 814. WE-Heraeus Seminar, Heritage of SOFIA – Scientific Highlights and Future Perspectives, Stuttgart, Germany
"SOFIA/EXES Survey of Gaseous Water in the Massive Young Binary W3 IRS 5"

Mar. 2024 APS Meeting, Minneapolis, MN
"SOFIA/EXES Survey of Gaseous Water in the Massive Young Binary W3 IRS 5"

Feb. 2022 SOFIA Conference, Lake Arrowhead, CA
"High-Resolution MIR Spectroscopy towards the Massive Young Stellar Binary W3 IRS 5"

Seminars

Feb. 2024 GBT Biweekly Webinar (invited virtual talk)
"Argus/GBT Observations of Molecular Gas in the Inner Regions of IC 342"

Jan. 2024 Huanyu Kaiwu Seminar, USTC, Hefei
"SOFIA/EXES Survey of Gaseous Molecules in Massive Protostars"

Jan. 2024 Martes Talk, Nanjing University, Nanjing (invited talk)
"SOFIA/EXES Survey of Gaseous Molecules in Massive Protostars"

Dec. 2023 PDS Seminar, Tsinghua University, Beijing
"High-Spectral Resolution MIR Spectroscopy: Unveiling the Innermost Structures of Massive Protostars"

Dec. 2023 SHAO Seminar, Shanghai
"SOFIA/EXES Survey of Gaseous Water in the Massive Young Binary W3 IRS 5"

Dec. 2023 Monday Afternoon Talk, MIT, MA
"SOFIA/EXES Survey of Gaseous Water in the Massive Young Binary W3 IRS 5"

Oct. 2018 TUNA Lunch Talk, NRAO, VA (invited talk)
"Resolving dense gas in galaxies: Argus/GBT's millimeter view of IC342"

Poster Presentations

Sep. 2023 The First Year of JWST Science Conference, Baltimore, MD
"Interpret Gaseous H_2O Absorption Ro-vibrational Lines Probed by JWST/MIRI"

Jun. 2023 Astrochemistry at High Resolution Faraday Discussion, Baltimore, MD
"Interpret Mid-Infrared Gas-Phase H_2O Absorption Ro-vibrational Lines Probed by JWST/MIRI Spectroscopy"

ACCEPTED PROPOSALS

2024 **VLA**. Co-I. "Resolved atomic ISM, HII regions and supernova remnants beyond the Local Group", PI: E. Koch. Awarded 176 hours.

2024 **GBT**. Co-I. "Resolving the turbulence-deficient molecular clouds in the outer Galaxy", PI: L. Lin. Awarded 21.00 hours.

2024 **SMA**. Co-I. "Resolved CO excitation across the Milky-Way Analog Galaxy IC342", PI: J. den Brok & E. Koch. Awarded 6 tracks.

2024 **IRAM**. Co-I. "Tracing the Physics of the Molecular ISM with CO Isotopologues across IC342", PI: I. Galić & J. den Brok. Awarded 64.8 hrs.

2023 **SMA**. Co-I. "Resolving Disks in the Massive Protostellar Binary W3 IRS 5", PI: A. Boogert. Awarded 5 tracks.

2022 **SMA**. Co-I. "Resolving Disks in the Massive Protostellar Binary W3 IRS 5", PI: A. Boogert. Awarded 5 tracks.

2021 **GBT**. Co-I. "GBT EDGE: A Representative Survey of the z=0 Universe with Full IFU Spectroscopy", PI: A. Bolatto. Awarded 300 hrs.

2020 **IRTF**. Co-I. "Surveying the Structure of Massive YSO Disks", PI: A. Barr. Awarded 10 hrs.

2020 **SOFIA**. Co-I. "EXES Survey of the Molecular Inventory of Hot Cores", PI: A. Tielens. Awarded 24.8 hrs.

2019 **GBT**. Co-I. "Characterizing the Internal Velocity Fields of Star-forming Cores with GBT-Argus", PI: C.-Y. Chen. Awarded 228.5 hrs.

2017 **GBT**. PI. "A large-scale mapping of molecular gas in the bright extra-galaxy IC342". Awarded 10 hrs.

OBSERVING EXPERIENCE

2017 – The Green Bank 100 m Telescope (GBT): over 120 hours of usage.
Observing routinely for large survey programs such as DEGAS, DiSCo, and EDGE.

2021 The NASA Infrared Telescope Facility (IRTF)

MENTORING

Oct. 2023 – Jul. 2024 Madden, M. C. L., First-year Master Research Project at Leiden University
"IR Spectroscopy of Warm Molecular Gas in Hot Cores". Co-advise with A. Tielens and A. Boogert.

TEACHING EXPERIENCE

Spring 2021	Grader, General Astronomy, Black Holes
Fall 2020	Grader, General Astronomy, Stars and Stellar Systems
Fall 2017	Grader, Life in the Universe, Astrophysics of Exoplanets
Spring 2017	Grader, The Solar Systems, Origin of the Universe
Fall 2016	Grader, Life in the Universe, Computational Astrophysics

HONORS AND AWARDS

2016	National Astronomical Observatories Scholarship
2016	Outstanding Graduate Scholarship
2015	Summer Research Fellowship at University of Oxford
2014	China Scholarship Council (CSC) Fellowship for undergraduate international exchange program
2012–2016	Outstanding Student Scholarship

RELEVANT SKILLS

Programming:	C, Python, GBTIDL, LaTeX, HTML
Astronomy Software:	MIR, CASA, TOPCAT, DS9
Languages:	English, Mandarin