Julia C. Santos

51 Pegasi b Fellow

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Appointments

51 Pegasi b Fellow *October 2025 -*

Center for Astrophysics, Harvard University

See my 51 Pegasi b Fellow profile for more information about the fellowship and my research.

Education

Ph.D. in Astronomy (cum laude; highest honors) *Leiden, the Netherlands*

Leiden University *July 2021 - July 2025*

- Thesis: Transformation and sublimation of interstellar ices: insights from laboratory experiments and astronomical observations
- Supervisors: Prof. Dr. Ewine van Dishoeck, Prof. Dr. Harold Linnartz‡
  ‡Deceased, 31/12/2023

M.Sc. in Astronomy *São Paulo, Brazil*

São Paulo University *August 2019 - February 2021*

- Thesis: Methyl acetylene in G331. 512-0.103: Looking at massive star formation through the lens of chemistry
- Supervisors: Prof. Dr. Jacques Lépine, Dr. Edgar Mendoza

B.Sc. in Chemistry *Rio de Janeiro, Brazil*

Federal University of Rio de Janeiro *August 2017 - July 2019*

- Thesis: Rotational spectrum simulations of astrochemically-relevant asymmetric tops
- Supervisors: Prof. Dr. Alexandre Rocha, Prof. Dr. Ricardo Oliveira

Publications

* corresponding author, † shared first authorship, ‡ student under my supervision

First-author papers (12)

J. C. Santos*, K. I. Öberg, A. Coutens, D. Harsono. 2026, ApJ. *Under review*.

J. C. Santos*, E. L. Piacentino, J. B. Bergner, M. Rajappan, K. I. Öberg. H2S ice sublimation dynamics: experimentally constrained binding energies, entrapment efficiencies, and snowlines. 2025, A&A, 698, A254.

J. C. Santos*, H. Linnartz, K.-J. Chuang. Formation of carbonyl sulfide (OCS) via SH radicals in interstellar CO-rich ice under dense cloud conditions. 2024c, A&A, 690, A24.

J. C. Santos*, M. L. van Gelder, P. Nazari, A. Ahmadi, E. F. van Dishoeck. SO2 and OCS toward high-mass protostars: A comparative study between ice and gas. 2024b, A&A, 689, A248.

J. C. Santos*, J. Enrique-Romero, T. Lamberts, H. Linnartz, K.-J. Chuang. Formation of S-bearing complex organic molecules in molecular clouds via ice reactions with C2H2, HS, and atomic H. 2024a, ACS Earth Space Chem, 8, 1646.

J. C. Santos*, H. Linnartz, K.-J. Chuang. Interaction of H2S with H atoms on grain surfaces under molecular cloud conditions. 2023b, A&A, 678, A112.

J. C. Santos*, K.-J. Chuang, J. G. M. Schrauwen, A. T. Muiña, J. Zhang, H. M. Cuppen, B. Redlich, H. Linnartz, S. Ioppolo. Resonant infrared irradiation of CO and CH3OH interstellar ices. 2023a, A&A, 672, A112.

J. C. Santos*, K.-J. Chuang, T. Lamberts, G. Fedoseev, S. Ioppolo, H. Linnartz. Experimental confirmation of a new formation route to CH3OH in interstellar ices: CH3O + H2CO → CH3OH + HCO. 2022c, ApJL, 931, L33.

J. C. Santos*,†, F. Fantuzzi†, H. M. Quitián-Lara, Y. Martins-Franco, K. Menéndez-Delmestre, H. M. Boechat-Roberty, R. R. Oliveira. Structure and stability of multiply charged naphthalene and its C10H8 isomers: bonding, spectroscopy, and astrophysical implications. 2022b, MNRAS, 512, 4669.

J. C. Santos[*], L. Bronfman, E. Mendoza, J. R. D. Lépine, N. U. Duronea, M. Merello, R. A. Finger. A spectral survey of CH3CCH in the Hot Molecular Core G331.512-0.103. 2022a, ApJ, 925, 3.

J. C. Santos, A. B. Rocha[*], R. R. Oliveira. Rotational spectrum simulations of asymmetric tops in an astrochemical context. 2020b, J. Mol. Model., 26, 278.

H. B. A. Cerqueira[†], **J. C. Santos**[†], F. Fantuzzi, F. de A. Ribeiro, M. L. M. Rocco, R. R. Oliveira[*], A. B. Rocha. Structure, stability, and spectroscopic properties of small acetonitrile cation clusters. 2020a, J. Phys. Chem. A, 124, 6845.

Contributed papers (12)

C. Mentzer, D. Harsono, J. B. Bergner, E. Dartois, J. A. Noble, Z.-Y. Li, K. Assani, M. Drozdovskaya, M. Narang, Y.-L. Yang, L. Welzel, W. E. Thompson, **J. C. Santos**. 2026, ApJ. *Submitted.*

N. G. C. Brunken, E. F. van Dishoeck, A. C. A. Boogert, P. Nazari, Y. Chen, **J. C. Santos**, H. Beuther, A. Caratti o Garatti, T. Megeath K. Slavicinska, C. Gieser H. Tyagi, L. Tychoniec, M. McClure, V. J. M. le Gouellec, Y. Yang, L. W. Looney, N. J. Evans, M. Narang. 2026, A&A. *Under review.*

K. Assani, Z.-Y. Li, J. B. Bergner, D. A. Neufeld, D. Harsono, M. N. Drozdovskaya, M. Padovani, E. Dartois, J. A. Noble, N. Arulanantham, A. S. Booth, Y.-L. Yang, M. Narang, W. E. Thompson, E. Yunerman, K. I. Öberg, **J. C. Santos**, C. Mentzer, J. P. Ramsey, L. Welzel, K. M. Pontoppidan, M. McClure. JWST Edge-on Disk Ice (JEDIce): Vibrationally hot, rotationally cold H2 in the outer disk of Oph 163131 non-thermally excited by UV and cosmic rays. 2026, ApJ. *In press.*

J. B. Bergner, N. Arulanantham, E. Dartois, M. N. Drozdovskaya, D. Harsono, M. McClure, J. A. Noble, K. I. Öberg, K. M. Pontoppidan, Y.-L. Yang, K. Assani, Z.-Y. Li, **J. C. Santos**, W. E. Thompson, L. Welzel, E. S. Yunerman, A. M. Arabhavi, A. S. Booth, C. Mentzer, M. Narang, T. Henning, I. Kamp, G. Perotti, A. Somigliana. JWST Edge-on Disk Ice (JEDIce): Program Overview and Ice Survey Results. 2026, ApJ, 1002, 17.

L. Coulaud[‡], **J. C. Santos**, K.-J. Chuang. Experimental investigation of O2 diffusion and entrapment in interstellar amorphous solid water. 2026, A&A, 707, A168.

E. Dartois[*], J. A. Noble, J. B. Bergner, K. M. Pontoppidan, K. Assani, D. Harsono, M. K. McClure, **J. C. Santos**, W. E. Thompson, L. Welzel, N. Arulanantham, A. S. Booth, M. N. Drozdovskaya, Z.-Y. Li, J. Ma, L. Martinien, F. Ménard, K. Oberg, K. Stapelfelt, Y.-L. Yang. The near-infrared silhouette of the Flying Saucer edge-on disc revealed by the JWST JEDIce program. 2026, A&A Letters, 705, L14.

S. Kyrkjebø[†], N. Rønne[†], **J. C. Santos**, L. Slumstrup, Z. Tang, M. Madden, A. Cassidy, R. Balog, J. D. Thrower, H. Linnartz, B. Hammer, L. Hornekær[*]. *Under review*.

L. Slumstrup, J. Thrower, J. G. M. Schrauwen, T. Lamberts, E. Ingman, D. Laurinavicius, J. DeVine, J. Terwisscha van Scheltinga, **J. C. Santos**, G. Wenzel, J. Noble, M. McCoustra, W. Brown, H. Linnartz, L. Hornekaer, H. M. Cuppen, B. Redlich, S. Ioppolo. IR-induced CO photodesorption from pure CO ice and CO on amorphous solid water (ASW). 2025, ACS Earth Space Chem, 9, 1607.

K. Slavicinska[*], A. C. A. Boogert, Ł. Tychoniec, E. F. van Dishoeck, M. L. van Gelder, M. G. Navarro, **J. C. Santos**, P. D. Klaassen, P. J. Kavanagh, K.-J. Chuang. Ammonium hydrosulfide (NH4SH): a potential significant sulfur sink in interstellar ices. 2025, A&A, 693, A146.

J. Zhang[*,†], A. T. Muiña[*,†], D. V. Mifsud, Z. Kaňuchová, K. Cielinska, P. Herczku, K. K. Rahul, S. T. S. Kovács, R. Rácz, **J. C. Santos**, A. T. Hopkinson, L. Craciunescu, N. C. Jones, S. V. Hoffmann, S. Biri, I. Vajda, I. Rajta, A. Dawes, B. Sivaraman, Z. Juhász, B. Sulik, H. Linnartz, L. Hornekær, F. Fantuzzi, N. J. Mason, S. Ioppolo. A systematic FTIR and VUV spectroscopic investigation of ion, electron, and thermally processed ethanolamine ice. 2024, MNRAS, 533, 826.

K.-J. Chuang[*], C. Jäger, **J. C. Santos**, Th. Henning. Formation of N-bearing complex organic molecules in molecular clouds: ketenimine, acetonitrile, acetaldimine, and vinylamine via the UV photolysis of C2H2 ice. 2024, A&A, 687, A7.

T. Lamberts[*], G. Fedoseev, M. van Hemert, D. Qasim, K.-J. Chuang, **J. C. Santos**, H. Linnartz. Methane formation in cold regions from carbon atoms and molecular hydrogen. 2022, ApJ, 928, 48.

Funding and Awards

Fellowships and grants

2025 - 2028 **51 Pegasi b Fellowship**: Heising-Simons Foundation, US
2025 - 2028 **(Declined) NASA Hubble Fellowship Program Sagan Fellowship**: STScI – NASA, US
2025 - 2028 **(Declined) Miller Research Fellowship**: Miller Institute, UC Berkeley, US
2025 - 2028 **(Declined) CfA Fellowship (JC Ryan)**: Center for Astrophysics, Harvard, US
2024 **LUF CWB grant**: Research internship at the Center for Astrophysics, Harvard University, US
2023 **IAU travel grant**: to attend the 2023 Kavli-IAU Astrochemistry Symposium, US
2023 **LKBF travel grant**: to attend the 2023 Kavli-IAU Astrochemistry Symposium, US
2019 **EuroPAH travel grant**: to attend the EuroPAH Summer School, FR

Scholarships

2019 - 2021 **Graduate research scholarship**: Academic Excellence Program, CAPES, BR
2017 - 2019 **Undergraduate research scholarship**: CNPq, BR

Awards

2026 **2026 Dissertation Prize**: AAS Laboratory Astrophysics Division (press release)
2026 **Honorable mention**: ACS Astrochemistry Subdivision Outstanding Dissertation Award
2025 **Nominated for the C.J. Kok Jury Prize for Best Thesis of the Year**: Awards the most impressive PhD thesis of Leiden University in the year of 2025
2019 **First-ranked candidate**: for the M.Sc. program in Astronomy at São Paulo University, BR
2019 **Best research of session**: 10a Semana de Integração Acadêmica, BR
2019 **Presentation award**: XX Brazilian Symposium of Theoretical Chemistry, BR
2018 **Presentation award**: 9a Semana de Integração Acadêmica, BR
2018 **Top 5 undergraduate research projects in the field of natural sciences**: XXII Encontro Latino Americano de Iniciação Científica, BR
2017 **Presentation award**: 8a Semana de Integração Acadêmica, BR

Awarded Telescope Time

As PI:

ALMA Cycle 13: 2026.1.00937.S (C-priority) *17.9h*

As Co-I:

ALMA Cycle 13: 2026.1.00309.S (PI: Y. Yamato; B-priority) *14.9h*

Supervisions and Mentorship

Direct Research Supervision

Jun 2026 - Pres. **Rhianne Tabayoyong**: B.Sc. student, PRISE Fellow; Harvard University.
Project: Spectroscopic characterization of C2H2 interstellar ices and comparison with astronomical observations
Feb 2025 - Feb 2026 **Lina Coulaud**: Exchange M.Sc. student, ERASMUS grantee; Université Paris-Saclay.
Project: Experimental investigation on the thermal diffusion dynamics of interstellar O2 ice
Jan 2024 - Jan 2025 **Kelly Ma**: M.Sc. student; Leiden University.
Project: Directly testing hot core gas vs ice chemistry: ALMA vs JWST
Sep 2023 - Jul 2024 **Iara Tiago**: M.Sc. student; Leiden University.
Project: Non-thermal desorption of interstellar ices induced by H2 formation: an experimental investigation

Additional Mentoring

July 2025 - Pres. **AMP-UP Mentor**: Mentorship program to provide advice and support to underrepresented PhD students performing astronomy-related research. **2 mentees** to date.

Teaching Experience

2021 - 2024 **Teaching assistant, Bachelor Research Project**: Bachelor's degree programs in Physics and Astronomy, Leiden University, NL. *250 hours/y*
Role: Coordinated course administration, monitored student progress, and graded written assignments and final presentations.

2023 **Guest lecturer, Astrochemistry**: Bachelors degree in Astronomy, Federal University of Rio de Janeiro, BR. *2 hours*
Role: Developed and delivered a guest lecture for undergraduate astronomy students.

2021 **Course Lecturer, Astrochemistry**: 24th Chemistry Week of the Chemistry Institute, Federal University of Rio de Janeiro, BR. *10 hours*
Role: Designed and delivered the complete 10-hour course, prepared teaching materials, and developed ungraded assignments.

Academic Leadership and Organisational Contribution

Entries marked "Conf." are confidential to preserve anonymity.

Conf. **Committee member**: AAS Laboratory Astrophysics Division Prize Committee

Conf. **Panel reviewer**: NASA's Exoplanets Research Program

2023 - Pres. **Journal reviewer**: Nature Astronomy • Communications Chemistry • The Astrophysical Journal • The Astrophysical Journal Letters • Astronomy and Astrophysics • ACS Earth and Space Chemistry • The Journal of Physical Chemistry

2026 - Pres. **Organizer**: Weekly sub-group meetings of the astrochemistry & disks research team; Center for Astrophysics | Harvard & Smithsonian

2026 **SOC Deputy Vice-chair**: CfA Science Meeting; Center for Astrophysics | Harvard & Smithsonian (100+ abstract submissions, 200+ registrations)

2026 **Chambliss Poster Judge**: AAS summer meeting

2021 - 2024 **Organizer**: Weekly meetings of the Laboratory for Astrophysics group, Leiden University

2021 - 2023 **Organizer**: Biweekly journal club of Leiden Observatory on interstellar ices

Selected Outreach

I engage in outreach activities both in person and through social media platforms (@chem_julia on Instagram). Below is a selection of my outreach activities.

2026 **Interview**: Podcast "Nau Espacial" (in Portuguese)

2025 **Interview**: Podcast "Astrochem Coffee" (in English)

2024 **Public talk**: Elas fazem ciência (She (plural) does science)–Online initiative targeted at high-school students in Brazil with an emphasis on women-led research in STEM

2023 **Interview**: Podcast "Café Debug" (in Portuguese)

2023 **Interview**: YouTube channel "Astrotubers", live broadcast (in Portuguese)

2022 **Public talk**: for elementary-school students at Maple Bear School, Ribeirão Preto, Brazil

2017 **Science communicator**: Museum "Ciência e Vida" at Duque de Caxias, Brazil. Delivered weekly educational sessions at the planetarium and the natural sciences collection.

Selected Presentations

Invited conference talks

2026 **III Workshop on Astrochemistry**: Rio de Janeiro, BR
2026 **AAS Summer Meeting**: Pasadena, US
2025 **Origins Federation Conference**: Chicago, US
2023 **Workshop on Interstellar Catalysis**: Fuglsøcentret, DK

Invited seminar talks

2026 **Radio-Millimeter-Submillimeter seminar**: Center for Astrophysics | Harvard & Smithsonian, Cambridge, US
2025 **Chalk Talk**: Harvard Origins of Life Initiative, Cambridge, US
2025 **Exoplanet Pizza Lunch**: Center for Astrophysics | Harvard & Smithsonian, Cambridge, US
2025 **Astronomy department seminar**: Universidade de São Paulo, São Paulo, BR
2024 **Astronomy department seminar**: Universidade Federal do Rio de Janeiro, Rio de Janeiro, BR
2024 **Astronomy department seminar**: Columbia University, New York, US
2024 **Disks group meeting**: Center for Astrophysics | Harvard & Smithsonian, Cambridge, US
2024 **Astrochemistry Reading Club**: Center for Astrophysics | Harvard & Smithsonian, Cambridge, US
2024 **Seminar at the Chemistry department**: Massachusetts Institute of Technology, Cambridge, US
2022 **Astrochemistry Seminar**: Leiden University, Leiden, NL

Contributed conference talks

2026 **ACS Spring 2026: The Icy Universe Revealed By JWST**: Atlanta, US
2025 **Towards New Frontiers: The Astrochemical Journey from Young Stellar Nurseries to Exoplanets**: Garching, DE
2024 **Chemistry and Physics at Low Temperatures**: Niseko, JP
2024 **QuantumGrain Workshop**: Barcelona, ES
2024 **Netherlands ALMA + JWST Joint Science Day**: Groningen, NL
2023 **Origins Center Conference**: Groningen, NL
2022 **NOVA Network II Meeting**: Leiden, NL
2019 **Astrochemistry LLAMA Meeting**: São Paulo, BR
2019 **10a Semana de Integração Acadêmica**: Rio de Janeiro, BR
2018 **9a Semana de Integração Acadêmica**: Rio de Janeiro, BR
2018 **XXII Encontro Latino Americano de Iniciação Científica**: São José dos Campos, BR
2017 **8a Semana de Integração Acadêmica**: Rio de Janeiro, BR

Additional presentations include eleven poster presentations at national and international meetings.

Additional Research Activities

Extended research stays

- Öberg Astrochemistry Group, Center for Astrophysics, Harvard University (US)—5 weeks (2024)
- Center for Interstellar Catalysis, Aarhus University (DK)—total of 8 weeks (2022, 2023)

Experience with Research Facilities

- Synchrotron accelerators: LNLS (BR), ASTRID (DK)
- Free-electron lasers: FELIX (NL)
- Low-temperature scanning tunneling microscope: LT-STM at Aarhus University (DK)