

Julia C. Santos

51 Pegasi b Fellow

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Appointments

51 Pegasi b Fellow

October 2025 -

CENTER FOR ASTROPHYSICS, HARVARD UNIVERSITY

Education

Ph.D. in Astronomy (cum laude)

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.

FIRST-AUTHOR PAPERS (11)

- 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 (7)

- 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. *Submitted*.
- 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. Hornekaer*. *Submitted*.
- 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. Hornekaer, F. Fantuzzi, N. J. Mason, S. Ioppolo. A systematic FTIR and VUV spectroscopic investigation of ion, electron, and thermally processed ethanamine 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.

Awards and Grants

FELLOWSHIPS

2025 - 2028	51 Pegasi b Fellowship: Heising-Simons Foundation, US	\$422.3k
2025 - 2028	NASA Hubble Fellowship Program Sagan Fellowship: STScI on behalf of NASA, US	Declined
2025 - 2028	Miller Research Fellowship: Miller Institute, UC Berkeley, US	Declined
2025 - 2028	JC Ryan Fellowship: Center for Astrophysics, Harvard, US	Declined

SCHOLARSHIPS

2019 - 2021	Graduate research scholarship: Academic Excellence Program, CAPES, BR	RS\$ 36k
2017 - 2019	Undergraduate research scholarship: CNPq, BR	RS\$ 10k

AWARDS & SMALLER GRANTS

2024	LUF CWB grant: for a research stay of five weeks at the Center for Astrophysics, Harvard University, US	€1.6k
2023	IAU travel grant: to attend the 2023 Kavli-IAU Astrochemistry Symposium, US	€300
2023	LKBF travel grant: to attend the 2023 Kavli-IAU Astrochemistry Symposium, US	€720
2019	First-ranked candidate: for the M.Sc. program in Astronomy at São Paulo University, BR	
2019	EuroPAH travel grant: to attend the EuroPAH Summer School, FR	€800
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

Presentations

INVITED CONFERENCE TALKS

- 2025 **Origins Federation Conference:** Chicago, USA
- 2023 **Workshop on Interstellar Catalysis:** Fuglsøcentret, DK

INVITED SEMINAR TALKS

- 2025 **Astronomy department:** Universidade de São Paulo, São Paulo, BR
- 2024 **Astronomy department:** Universidade Federal do Rio de Janeiro, Rio de Janeiro, BR
- 2024 **Astronomy department:** Columbia University, New York, US
- 2024 **Center for Astrophysics:** Harvard University, Cambridge, US
- 2024 **Astrochemistry Reading Club:** Harvard University, Cambridge, US
- 2024 **Chemistry department:** Massachusetts Institute of Technology, Cambridge, US

CONTRIBUTED CONFERENCE TALKS

- 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

POSTER PRESENTATIONS

- 2023 **Kavli-IAU Astrochemistry Symposium:** Traverse City, US
- 2022 **School on Laboratory Astrophysics:** Les Houches, FR
- 2022 **Niels Bohr Legacy Symposium in Astrochemistry:** Copenhagen, DK
- 2021 **European Conference on Laboratory Astrophysics:** Ana Capri, IT
- 2021 **Annual Meeting of the European Astronomical Society:** Online
- 2020 **Physique et Chimie du Milieu Interstellaire:** Online
- 2019 **XX Brazilian Symposium of Theoretical Chemistry:** João Pessoa, BR
- 2019 **EuroPAH Summer School:** Toulouse, FR
- 2019 **IV Winter School of the Valongo Observatory:** Rio de Janeiro, BR
- 2018 **41st Annual Reunion of the Brazilian Chemical Society:** Foz do Iguaçu, BR
- 2017 **XLI Annual Reunion of the Brazilian Astronomical Society:** São Paulo, BR

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 LARGE FACILITIES

- Synchrotron accelerators: LNLS (BR), ASTRID (DK)
- Free-electron lasers: FELIX (NL)

Mentorship Experience

- July 2025 - Pres. **AMP-UP Mentor:** Mentorship program in which current and previous prize postdoctoral fellows in astronomy provide professional and academic advice and support to PhD students performing astronomy-related research
- Feb 2025 - Pres. **Lina Coulaud:** Exchange M.Sc. student, Université Paris-Saclay.
Project: Experimental investigation on the thermal diffusion dynamics of interstellar O2 ice
- Jan 2024 - **Kelly Ma:** M.Sc. student, Leiden University.
Jan 2025 *Project:* Directly testing hot core gas vs ice chemistry: ALMA vs JWST
- Sep 2023 - **Iara Tiago:** M.Sc. student, Leiden University.
Jul 2024 *Project:* Non-thermal desorption of interstellar ices induced by H₂ formation: an experimental investigation

Teaching Experience

- 2021 - 2024 **Teaching assistant, Bachelor Research Project:** Bachelors degrees in Physics and Astronomy, Leiden University, NL *504 hours/y*
- 2023 **Invited guest lecturer (1 lesson), Astrochemistry course:** Bachelors degree in Astronomy, Federal University of Rio de Janeiro, BR *2 hours*
- 2021 **Invited lecturer (full course), Astrochemistry course:** 24th Chemistry Week of the Chemistry Institute, Federal University of Rio de Janeiro, BR *10 hours*

Professional Service

- 2023 - Pres. **Journal reviewer:** Nature Astronomy • The Astrophysical Journal • The Astrophysical Journal Letters • Astronomy and Astrophysics • ACS Earth and Space Chemistry • The Journal of Physical Chemistry
- 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. I communicate science online with a focus on astrochemistry for a primarily portuguese-speaking community. Below is a selection of my outreach activities.

- 2025 **Interview on my research:** Podcast on astrochemistry “Astrochem Coffee”—created by Prof. Brett McGuire at MIT
- 2023 **Interview on Experimental Astrochemistry:** Brazilian podcast “Café Debug”
- 2023 **Interview on Experimental Astrochemistry:** Brazilian YouTube channel “Astrotubers”, live broadcast
- 2022 **Talk on Astrochemistry:** for elementary-school students at Maple Bear School, Ribeirão Preto, Brazil
- Science communicator:** Public Museum “Ciência e Vida”—Duque de Caxias, Brazil.
- 2017 Delievered regular educational sessions at the planetarium and the natural sciences collection

Additional Information

LANGUAGES

- Portuguese—First language
- English—Fluent
- French—Advanced
- Japanese—Conversational
- Spanish—Conversational
- Dutch—Intermediate