

Julia C. Santos

51 Pegasi b Fellow

Center for Astrophysics, Harvard University -- 60 Garden St, Cambridge, MA 02138, USA

✉ julia.santos@cfa.harvard.edu | 🏠 juliacsantos.com

Appointments

51 Pegasi b Fellow

October 2025 -

CENTER FOR ASTROPHYSICS, HARVARD UNIVERSITY

More information about the fellowship: <https://www.hsfoundation.org/fellow/julia-santos/>

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, [‡] 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, ApJ. *Submitted*.
- 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. Öberg, 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.

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	CfA Fellowship (JC Ryan): Center for Astrophysics, Harvard, US	Declined

SCHOLARSHIPS

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

AWARDS & OTHER GRANTS

2026	2026 Dissertation Prize: AAS Laboratory Astrophysics Division (press release: https://lad.aas.org/2026-dissertation-prize/)	
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	
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

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

INVITED SEMINAR TALKS

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

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

Mentorship Experience

- Jun 2026 - **Rhianne Tabayoyong:** B.Sc. student, PRISE Fellow; Harvard University.
 Pres. *Project:* Spectroscopic characterization of C₂H₂ interstellar ices and comparison with astronomical observations
- July 2025 - **AMP-UP Mentor:** Mentorship program to provide advice and support to underrepresented
 Pres. PhD students performing astronomy-related research. **2 mentees** to date.
- Feb 2025 - **Lina Coulaud:** Exchange M.Sc. student, ERASMUS grantee; Université Paris-Saclay.
 Feb 2026 *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

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

Professional Service

Entries marked “Conf.” are confidential to preserve anonymity.

- 2023 – **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
- Conf. **Committee member:** AAS LAD Subdivision Prize Committee
- Conf. **Panel reviewer:** NASA’s Exoplanets Research Program
- 2026 **SOC Member:** CfA Science Day; Center for Astrophysics | Harvard & Smithsonian
- 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)
Public talk: Elas fazem ciência (She (plural) does science)–Online DEI and outreach initiative targeted at high-school students in Brazil with an emphasis on women-led research in STEM
- 2024 **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
Science communicator: Public Museum “Ciência e Vida” at Duque de Caxias, Brazil.
- 2017 Delievered regular educational sessions at the planetarium and the natural sciences collection.