

# Julia C. Santos

## 51 Pegasi b Fellow

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## Appointments

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### 51 Pegasi b Fellow

October 2025 -

CENTER FOR ASTROPHYSICS, HARVARD UNIVERSITY

## Education

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### 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<sup>‡</sup>  
<sup>‡</sup>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

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

### FIRST-AUTHOR PAPERS (11)

- J. C. Santos\***, E. L. Piacentino, J. B. Bergner, M. Rajappan, K. I. Öberg. H<sub>2</sub>S 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. SO<sub>2</sub> 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 C<sub>2</sub>H<sub>2</sub>, HS, and atomic H. 2024a, *ACS Earth Space Chem*, 8, 1646.
- J. C. Santos\***, H. Linnartz, K.-J. Chuang. Interaction of H<sub>2</sub>S 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 CH<sub>3</sub>OH 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 CH<sub>3</sub>OH in interstellar ices: CH<sub>3</sub>O + H<sub>2</sub>CO → CH<sub>3</sub>OH + HCO. 2022c, *ApJL*, 931, L33.
- J. C. Santos\***<sup>†</sup>, F. Fantuzzi<sup>‡</sup>, 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 C<sub>10</sub>H<sub>8</sub> 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 CH<sub>3</sub>CCH 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 (10)

- 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. *Submitted*.
- 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. 2026, ApJ, *in press*.
- L. Coulaud‡, **J. C. Santos**, K.-J. Chuang. Experimental investigation of O<sub>2</sub> diffusion and entrapment in interstellar amorphous solid water. 2026, A&A, *in press*.
- 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\*. *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 (NH<sub>4</sub>SH): 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 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 C<sub>2</sub>H<sub>2</sub> 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

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### FELLOWSHIPS

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

### SCHOLARSHIPS

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

## AWARDS & OTHER GRANTS

2026	<b>2026 Dissertation Prize:</b> of the AAS Laboratory Astrophysics Division (press release: <a href="https://lad.aas.org/2026-dissertation-prize/">https://lad.aas.org/2026-dissertation-prize/</a> )	
2025	<b>Nominated for the C.J. Kok Jury Prize for Best Thesis of the Year:</b> Awards the most impressive PhD thesis of Leiden University in the year of 2025	
2024	<b>LUF CWB grant:</b> for a research stay of five weeks at the Center for Astrophysics, Harvard University, US	€1.6k
2023	<b>IAU travel grant:</b> to attend the 2023 Kavli-IAU Astrochemistry Symposium, US	€300
2023	<b>LKBF travel grant:</b> to attend the 2023 Kavli-IAU Astrochemistry Symposium, US	€720
2019	<b>First-ranked candidate:</b> for the M.Sc. program in Astronomy at São Paulo University, BR	
2019	<b>EuroPAH travel grant:</b> to attend the EuroPAH Summer School, FR	€800
2019	<b>Best research of session:</b> 10a Semana de Integração Acadêmica, BR	
2019	<b>Presentation award:</b> XX Brazilian Symposium of Theoretical Chemistry, BR	
2018	<b>Presentation award:</b> 9a Semana de Integração Acadêmica, BR	
2018	<b>Top 5 undergraduate research projects in the field of natural sciences:</b> XXII Encontro Latino Americano de Iniciação Científica, BR	
2017	<b>Presentation award:</b> 8a Semana de Integração Acadêmica, BR	

## Presentations

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### 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

- 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

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- Feb 2025 - **Lina Coulaud:** Exchange M.Sc. student, Université Paris-Saclay.
- Feb 2026 *Project:* Experimental investigation on the thermal diffusion dynamics of interstellar O<sub>2</sub> 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 H<sub>2</sub> formation: an experimental investigation

## Teaching Experience

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

## Professional Service

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- 2026 - Pres. **Panel reviewer:** NASA's Exoplanets Research Program
- Journal reviewer:** Nature Astronomy • The Astrophysical Journal • The Astrophysical Journal Letters • Astronomy and Astrophysics • ACS Earth and Space Chemistry • The Journal of Physical Chemistry
- 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

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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.

- 2025 **Interview on my research:** Podcast “Astrochem Coffee” (in English)
- 2024 **Public talk on astrochemistry:** 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
- 2023 **Interview on laboratory astrochemistry:** Podcast “Café Debug” (in Portuguese)
- 2023 **Interview on laboratory astrochemistry:** YouTube channel “Astrotubers”, live broadcast (in Portuguese)
- 2022 **Talk on astrochemistry:** for elementary-school students at Maple Bear School, Ribeirão Preto, Brazil
- 2017 **Science communicator:** Public Museum “Ciência e Vida”—Duque de Caxias, Brazil. Delievered regular educational sessions at the planetarium and the natural sciences collection