Julia C. Santos

Leiden Observatory, Leiden University — PO Box 9513, 2300 RA Leiden, The Netherlands
santos@strw.leidenuniv.nl | juliacsantos.com

Education

Ph.D. in Astronomy — *Leiden, the Netherlands*
Leiden University — *July 2021 - Expected: June 2025*

- Thesis: Unraveling the origins of interstellar ices
- Supervisors: Prof. Ewine van Dishoeck, Prof. Harold Linnartz‡, Dr. Ko-Ju Chuang
  ‡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. 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. Alexandre Rocha, Prof. Ricardo Oliveira

Publications

* corresponding author, † shared first authorship.

First-author papers (10)

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. Traspas 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. 2020, 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. 2020, J. Phys. Chem. A, 124, 6845.

Contributed papers (4)

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, and K.-J. Chuang. Ammonium hydrosulfide (NH4SH): a potential significant sulfur sink in interstellar ices. 2024, A&A, in press.

J. Zhang*,†, A. Traspas 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 C_2H_2 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, Scholarships, and Grants

Scholarships

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

Awards & Grants

2024 **LUF CWB grant**: for a research stay of five weeks 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 **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
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 (6) and contributed (10) talks

2024	**Seminar at the Astronomy department**: Universidade Federal do Rio de Janeiro, Rio de Janeiro, BR	*Invited*
2024	**Chemistry and Physics at Low Temperatures**: Niseko, JP	*Contributed*
2024	**QuantumGrain Workshop**: Barcelona, ES	*Contributed*
2024	**Seminar at the Astronomy department**: Columbia University, New York, US	*Invited*
2024	**Seminar at the Center for Astrophysics**: Harvard University, Cambridge, US	*Invited*
2024	**Seminar at the Astrochemistry Reading Club**: Harvard University, Cambridge, US	*Invited*
2024	**Seminar at the Chemistry department**: Massachusetts Institute of Technology, Cambridge, US	*Invited*
2024	**Netherlands ALMA + JWST Joint Science Day**: Groningen, NL	*Contributed*
2023	**Origins Center Conference**: Groningen, NL	*Contributed*
2023	**Workshop on Interstellar Catalysis**: Fuglsøcentret, DK	*Invited*
2022	**NOVA Network II Meeting**: Leiden, NL	*Contributed*
2019	**Astrochemistry LLAMA Meeting**: São Paulo, BR	*Contributed*

2019	**10a Semana de Integração Acadêmica**: Rio de Janeiro, BR	*Contributed*
2018	**9a Semana de Integração Acadêmica**: Rio de Janeiro, BR	*Contributed*
2018	**XXII Encontro Latino Americano de Iniciação Científica**: São José dos Campos, BR	*Contributed*
2017	**8a Semana de Integração Acadêmica**: Rio de Janeiro, BR	*Contributed*

Poster presentations (11)

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 Millieu 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

2024 - Pres.	**Kelly Ma**: M.Sc. student, Leiden University. Thesis: Directly testing hot core gas vs ice chemistry: ALMA vs JWST
2023 - 2024	**Iara Tiago**: M.Sc. student, Leiden University. Thesis: 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**: Astronomy and Astrophysics, The Astrophysical Journal, ACS Earth and Space 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 DEI & Outreach

I engage in DEI and outreach activities both in person and through social media platforms: @santos_j_ on X (formerly Twitter) and @chem_julia on Instagram. I communicate science online with a focus on astrochemistry for a primarily portuguese-speaking community of over 7k followers. Below is a selection of my outreach and DEI activities.

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 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, Ribirão 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 for an audience of all ages and backgrounds