

Julia C. Santos

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Education

Ph.D. in Astronomy

LEIDEN UNIVERSITY

- Thesis: Unraveling the origins of interstellar ices
- Supervisors: Prof. Dr. Ewine van Dishoeck, Prof. Dr. Harold Linnartz[‡]
[‡]Deceased, 31/12/2023

Leiden, the Netherlands

July 2021 - Expected: June 2025

M.Sc. in Astronomy

SÃO PAULO UNIVERSITY

- 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

São Paulo, Brazil

August 2019 - February 2021

B.Sc. in Chemistry

FEDERAL UNIVERSITY OF RIO DE JANEIRO

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

Rio de Janeiro, Brazil

August 2017 - July 2019

Publications

* corresponding author, † shared first authorship.

FIRST-AUTHOR PAPERS (11)

- J. C. Santos***, E. L. Piacentino, J. B. Bergner, M. Rajappan, K. Öberg. H₂S ice sublimation dynamics: experimentally constrained binding energies, entrapment efficiencies, and snowlines. *In review*.
- 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. Qutián-Lara, Y. Martins-Franco, K. Menéndez-Delmestre, H. M. Bochat-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 (5)

- 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. Cuppen, B. Redlich, S. Ioppolo. IR-induced CO photodesorption from pure CO ice and CO on amorphous solid water (ASW). *In review*.
- K. Slavcinska*, 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. 2025, *A&A*, 693, A146.
- 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 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	\$450k
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	R\$ 36k
2017 - 2019	Undergraduate research scholarship: CNPq, BR	R\$ 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 (7) AND CONTRIBUTED (10) TALKS

2025	Seminar at the Astronomy department: Universidade de São Paulo, São Paulo, BR	Invited
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	<i>Invited</i>
2024	Seminar at the Astrochemistry Reading Club: Harvard University, Cambridge, US	<i>Invited</i>
2024	Seminar at the Chemistry department: Massachusetts Institute of Technology, Cambridge, US	<i>Invited</i>
2024	Netherlands ALMA + JWST Joint Science Day: Groningen, NL	<i>Contributed</i>
2023	Origins Center Conference: Groningen, NL	<i>Contributed</i>
2023	Workshop on Interstellar Catalysis: Fuglsøcentret, DK	<i>Invited</i>
2022	NOVA Network II Meeting: Leiden, NL	<i>Contributed</i>
2019	Astrochemistry LLAMA Meeting: São Paulo, BR	<i>Contributed</i>
2019	10a Semana de Integração Acadêmica: Rio de Janeiro, BR	<i>Contributed</i>
2018	9a Semana de Integração Acadêmica: Rio de Janeiro, BR	<i>Contributed</i>
2018	XXII Encontro Latino Americano de Iniciação Científica: São José dos Campos, BR	<i>Contributed</i>
2017	8a Semana de Integração Acadêmica: Rio de Janeiro, BR	<i>Contributed</i>

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 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

Feb 2024 - Pres.	Daan Willemse: B.Sc. student, Leiden University. Thesis: Exploring thermal and radiation-driven chemistry of carbon oxides and oxygen-bearing COMs in laboratory interstellar ice analogs (jointly with Femke Obbens)
Feb 2024 - Pres.	Femke Obbens: B.Sc. student, Leiden University. Thesis: Exploring thermal and radiation-driven chemistry of carbon oxides and oxygen-bearing COMs in laboratory interstellar ice analogs (jointly with Daan Willemse)
Feb 2025 - Pres.	Lina Coulaud: Exchange M.Sc. student, Université Paris-Saclay. Project: Formation of SO ₂ ice under dark cloud conditions: an experimental investigation
Jan 2024 - Jan 2025	Kelly Ma: M.Sc. student, Leiden University. Thesis: Directly testing hot core gas vs ice chemistry: ALMA vs JWST
Sep 2023 - Jul 2024	Iara Tiago: M.Sc. student, Leiden University. Thesis: Non-thermal desorption of interstellar ices induced by H ₂ 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: The Journal of Physical Chemistry, 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

Additional Information

LANGUAGES

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

TREASURER OF THE DAIDOKAN KARATE ASSOCIATION

Since December 2023, I have served as the elected (volunteer) treasurer of Daidokan Karate Leiden, a non-profit organization with a 35-year history. The association is dedicated to teaching karate, self-defense, and modern Arnis to women of all backgrounds and physical abilities.