Christopher Nelson Shingledecker

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Academic Appointments

2024-present Assistant Professor of Chemistry, Virginia Military Institute

2020-2024 Assistant Professor of Physics and Astronomy, Benedictine College

2018-2020 Alexander von Humboldt Foundation/Stiftung Postdoctoral Research Fellow

Education

2018 **Doctor of Philosophy**, *University of Virginia*, Charlottesville, VA, *Physical Chemistry.*

2013 **Bachelor of Science**, *University of Virginia*, Charlottesville, VA, *with Highest Distinction, ACS Certification, Distinguished Major Program.*
Major: Chemistry
Minor: Astronomy

Publications and Metrics

Publication Breakdown

42 Number of total refereed articles

14 Number of articles as first or second author

1 Number of articles as senior author

11 Number of articles with undergraduate student researchers

3 Number of articles in *Science*-family journals

3 Number of articles in *Nature*-family journals

Google Scholar Metrics

2605 Citations

27 h-Index

38 i10-Index

Awards and Honors

2021 Benedictine College Teaching Excellence Award Nominee

2019 Coalition for Academic Scientific Computation (CASC) Research Highlight

2018 Alexander von Humboldt Foundation Postdoctoral Research Fellowship

2018 Adam Ritchie Outstanding Graduate Student Award

2018 PCCP HOT Article: A general method for the inclusion of radiation chemistry in astrochemical models

2017 PCCP HOT Article: A new model of the chemistry of ionizing radiation in solids: CIRIS

2017 Rao Prize, presented at the 73^{rd} *International Symposium on Molecular Spectroscopy*

2017 NASA ROSES Proposal Writing Retreat Winner

2015 DOE NNSA Stewardship Science Graduate Fellowship: Honorable Mention

2013 Oscar R. Rodig Excellence in Chemistry Award

Links to Selected Research-Related Press

The Leaven — Benedictine professor helps discover new molecules in space

Ad Astra Kansas — Benedictine scientist is part of new discovery in interstellar space

Scientific American — Molecular Clue to the Mystery of Carbon's Cosmic Origin Uncovered

Science — Detecting the building blocks of aromatics

Daily Mail — Did life's building blocks form in interstellar ice? Cosmic rays can create molecules in frozen dust clouds between stars

Newsweek — Benzonitrile: Organic Molecule Discovered in Space Smells Like Almonds

Discover Magazine — ALMA Radio Telescope is Searching the Stars With Its Highest-ever Frequencies

C&EN — Radio telescope spots aromatic molecule for the first time

Gizmodo — Astronomers Detect Almond-Scented Molecule That Will Help Solve Interstellar Radiation Mystery

Phys.Org — ALMA's highest frequency receiver produces its first scientific result on massive star formation

Phys.Org — GBT detection unlocks exploration of 'aromatic' interstellar chemistry

Phys.Org — Models suggest cosmic rays can trigger reactions in interstellar ice balls causing formation of more complex molecules

Professional Associations & Honor Societies

American Chemical Society - *Member*

American Astronomical Society - *Full Member*

Radiation Research Society - *Member*

International Astronomical Union - *Member*

Alpha Chi Sigma Chemistry Fraternity - *Professional Member*

Phi Beta Kappa Honor Society - *Member*

Mu Alpha Theta Honor Society - *Member*

Society of Catholic Scientists - *Regular Member*

Teaching Experience

CH 301	**Physical Chemistry I**, *Virginia Military Institute.*
CH 311W	**Physical Chemistry Lab**, *Virginia Military Institute.*
CH 117	**General Chemistry Lab**, *Virginia Military Institute.*
ASTR 1300	**Sun and Solar System**, *Benedictine College.*
PHYS 1300	**Our strange universe**, *Benedictine College.*
PHYS 2000	**College Physics I**, *Benedictine College.*
PHYS 2010	**College Physics II**, *Benedictine College.*
PHYS 2011	**College Physics II Lab**, *Benedictine College.*
PHYS 2111	**Classical Physics II Lab**, *Benedictine College.*
PHYS 4400	**Thermodynamics/Statistical Mechanics**, *Benedictine College.*
NASC 1600	**The Origins of the Major Ideas of Science**, *Benedictine College.*
GNST 1000	**BC Experience**, *Benedictine College.*

Mentoring and Advising

Discovery Day Projects

2020-2021	**Developing Mission-Critical Software for the James Webb Space Telescope**, *Daniel López-Sanders*, Talk.

BC Students Advised

2020-2021	Hongji Wei

BC Research Students

2021-present	Colin Donovan
2021	Mary Emma Schreffler
2020-present	Daniel López-Sanders
2020-present	Garrett Nobis
2020-present	Joseph Wandishin
2020-2021	Yi Kang
2020-2021	Hongji Wei

Other Mentees

Graduate Students Mentored

☞ Kristen Darnell (San Jose State U.) Sean Schulte (UVa), Dominique Maffucci, Ph.D. (UVa), Ci Xue (UVa), Jessica Tennis (UVa), Alec Paulive (UVa)

Undergraduate Students Mentored

☞ Aury Hay (Princeton), Ella Mullikin (Ga. Tech), Hannah Anderson (Wellesley), Natalie O'Hern (Wellesley), Viktoria Korn (Uni. Stuttgart), Alexander Thomas (UVa), Alexandra Pentel (UVa), Emmit Pert (UVa), Wyatt Ochs (UVa), Eric Rohr (UVa)

Selected Service

Refereeing Duties

since 2017 ACS Earth & Space Chemistry

since 2018 The Astrophysical Journal

since 2018 Nuclear Instruments and Methods in Physics Research, Section B

since 2019 Journal of Physical Chemistry

since 2020 Astronomy & Astrophysics

since 2020 Monthly Notices of the Royal Astronomical Society

Scientific Organizing Committees

2024 **Cosmic Rays 3**, *Galileo Galilei Institute for Theoretical Physics*, Osservatorio Astrofisico di Arcetri., Florence, Italy.
October 2024

2021–2022 **Kansas City Humboldt Kolleg**, *Kansas City Marriott Downtown*, Benedictine College/Max Planck Institute for Plasma Physics, Kansas City, MO, USA.
May 2022

2017–2018 **14$^{\text{th}}$ Astrobiology Graduate Conference (AbGradCon)**, *Georgia Tech*, Atlanta, GA, USA, June 2018.

2016–2017 **13$^{\text{th}}$ Astrobiology Graduate Conference (AbGradCon)**, *University of Virginia*, Charlottesville, VA, USA, June 2017.

Selected Presentations to the General Public

May 2021 Olathe High School - Olathe, KS

Jan. 2021 Astronomical Society of Kansas City - Virtual

May 2015 McCormick Observatory - Charlottesville, VA

Oct. 2015 Fan Mountain Observatory - Covesville, VA

Other Activities

2015–2017 **Treasurer**, *$\alpha\kappa$ Chapter Housing Corporation*, AXΣ Professional Fraternity, University of Virginia.
Charlottesville, VA, USA

2012–2013 **Chapter Reporter**, *$\alpha\kappa$ Chapter*, AXΣ Professional Fraternity, University of Virginia.
Charlottesville, VA, USA

Third-party Funding

2018 **Alexander von Humboldt Research Fellowship**, *$106,531.03.*

2018 **Carl Friedrich von Siemens Fellowship**, *$9,279.86.*

2019 **IAU Travel Grant**, *$648.49.*

Total, *$116,459.38.*

Doctoral Thesis

Title *On Cosmic Rays in Astrochemical Models*

Supervisor Eric Herbst

Selected Publications

Works as Senior Author

[1] Anderson, H., O'Hern, N., Arumainayagam, C. R., Vasyunin, A., Majumdar, L., Gerakines, P. A., van Dishoeck, E., Caselli, P., & **Shingledecker, C. N.**, A New Method for Modeling UV-Driven Photoprocesses. 2020, 910, 72

Works as First or Second Author

[14] **Shingledecker, C. N.**, Lee, K. L. K., Wandishin, J. T., Balucani, N., Burkhardt, A. M., Charnley, S. B., Loomis, R., Schreffler, M., Siebert, M., McCarthy, M. C., McGuire, B. A. Detection of Interstellar H2CCC3HCN. 2021, *Astronomy & Astrophysics Letters*, accepted

[13] Paulive, A., **Shingledecker, C. N.**, Herbst, E. The Role of Radiolysis in the Modelling of C2H4O2 Isomers and Dimethyl Ether in Cold Dark Clouds. *Monthly Notices of the Royal Astronomical Society* 2021, 500 (3), 34143424.

[12] **Shingledecker, C. N.**, Incerti, S., Ivlev, A., Emfietzoglou, D., Kyriakou, I., Vasyunin, A., Caselli, P. Cosmic-Ray Tracks in Astrophysical Ices: Modeling with the Geant4-DNA Monte Carlo Toolkit. *Astrophysical Journal* 2020, 904 (2), 189.

[11] **Shingledecker, C. N.**, Lamberts, T., Laas, J., Vasyunin, A., Herbst, E., Kästner, J. K., & Caselli, P., Efficient Production of S_8 in Interstellar Ices: The effects of cosmic ray-driven radiation chemistry and non-diffusive bulk reactions. *Astrophysical Journal*, 2020, 888, 1

[10] McGuire, B. A., **Shingledecker, C. N.**, Willis, E. R, Lee, K. L. K., Martin-Drumel, M. A., Blake, G. A., Brogan, C. L., Burkhardt, A. M., Caselli, P., Chuang, K. J., El-Abd, S., Hunter, T. R., Ioppolo, S., Linnartz, H., Remijan, A. J., Xue, C., & McCarthy, M. C., Searches for Interstellar HCCSH and H_2CCS. *Astrophysical Journal*, 2019, 883, 2

[9] Burkhardt, A. M., **Shingledecker, C. N.**, Le Gal, R. A., McGuire, B. A., Remijan, A. J., & Herbst, E., Modeling C-Shock Chemistry in Isolated Molecular Outflows. *Astrophysical Journal*, 2019, 881, 32

[8] **Shingledecker, C. N.**, Alvarez-Barcia, S., Korn, V., & Kästner, J., The Case of H_2C_3O Isomers, Revisited: Solving the Mystery of the Missing Propadienone. *Astrophysical Journal*, 2019, 879, 2

[7] **Shingledecker, C. N.**, Vasyunin, A., Herbst, E., & Caselli, P., On Simulating the Proton-Irradiation of O_2 and H_2O Ices Using Astrochemical-Type Models, with Implications for Bulk Reactivity. *Astrophysical Journal*, 2019, 876, 2

[6] **Shingledecker, C. N.**, Tennis, J., Le Gal, R., & Herbst, E., On Cosmic-Ray-driven Grain Chemistry in Cold Core Models. *Astrophysical Journal*, 2018, 861, 1

[5] **Shingledecker, C. N.** & Herbst, E., A general method for the inclusion of radiation chemistry in astrochemical models. *Physical Chemistry Chemical Physics*, 2018, 20

[4] McGuire, B. A., **Shingledecker, C. N.**, Willis, E. R., Burkhardt, A. M., El-Abd, S., Motiyenko, R. A., Brogan, C. L., Hunter, T. R., Margules, L., Guillemin, J. C., Garrod, R. T., Herbst, E., & Remijan, A. J., ALMA Detection of Interstellar Methoxymethanol (CH_3OCH_2OH). *Astrophysical Journal, letters*, 2017, 851, 2

[3] **Shingledecker, C. N.**, Le Gal, R. A., & Herbst, E., A new model of the chemistry of ionizing radiation in solids: CIRIS. *Physical Chemistry Chemical Physics*, 2017, 19, 18

[2] Loomis, R. A., **Shingledecker, C. N.**, Langston, G., McGuire, B. A., Dollhopf, N. M., Burkhardt, A. M., Corby, J., Booth, S. T., Carroll, P. B., Turner, B., & Remijan, A. J., Non-detection of $HC_{11}N$ towards TMC-1: constraining the chemistry of large carbon-chain molecules. *Monthly Notices of the Royal Astronomical Society*, 2016, 463, 4

[1] **Shingledecker, C. N.**, Bergner, J. B., Le Gal, R. A., Öberg, K. I., Hincelin, U., & Herbst, E., On the Inference of the Cosmic-ray Ionization Rate ζ from the HCO^+-to-DCO^+ Abundance Ratio: The Effect of Nuclear Spin. *Astrophysical Journal*, 2016, 830, 2

Works as Contributing Author

[11] Burkhardt, A. M., Loomis, R. A., **Shingledecker, C. N.**, Lee, K. L. K., Remijan, A. J., McCarthy, M. C., McGuire, B. A. Ubiquitous Aromatic Carbon Chemistry at the Earliest Stages of Star Formation. *Nature Astronomy* 2021, 5, 181187.

[10] Doddipatla, S., Galimova, G. R., Wei, H., Thomas, A. M., He, C., Yang, Z., Morozov, A. N., **Shingledecker, C. N.**, Mebel, A. M., Kaiser, R. I. Low-Temperature Gas-Phase Formation of Indene in the Interstellar Medium. *Science Advances* 2021, 7 (1)

[9] Kleimeier, N. F., Abplanalp, M. J., Johnson, R. N., Gozem, S., Wandishin, J., **Shingledecker, C. N.**, Kaiser, R. I. Cyclopropenone (c-C3H2O) as a Tracer of the Nonequilibrium Chemistry Mediated by Galactic Cosmic Rays in Interstellar Ices. *Astrophysical Journal* 2021, 911 (1), 24.

[8] Loomis, R. A., Burkhardt, A. M., **Shingledecker, C. N.**, Charnley, S. B., Cordiner, M. A., Herbst, E., Kalenskii, S., Lee, K. L. K., Willis, E. R., Xue, C., Remijan, A. J., McCarthy, M. C., McGuire, B. A. An Investigation of Spectral Line Stacking Techniques and Application to the Detection of HC11N. *Nature Astronomy* 2021, 5, 188196.

[7] McCarthy, M. C., Lee, K. L. K., Loomis, R. A., Burkhardt, A. M., **Shingledecker, C. N.**, Charnley, S. B., Cordiner, M. A., Herbst, E., Kalenskii, S., Willis, E. R., Xue, C., Remijan, A. J., McGuire, B. A. Interstellar Detection of the Highly Polar Five-Membered Ring Cyanocyclopentadiene. *Nature Astronomy* 2021, 5, 176180.

[6] McGuire, B. A., Loomis, R. A., Burkhardt, A. M., Lee, K. L. K., **Shingledecker, C. N.**, Charnley, S. B., Cooke, I. R., Cordiner, M. A., Herbst, E., Kalenskii, S., Siebert, M. A., Willis, E. R., Xue, C., Remijan, A. J., McCarthy, M. C. Detection of Two Interstellar Polycyclic Aromatic Hydrocarbons via Spectral Matched Filtering. *Science* 2021, 371 (6535), 12651269.

[5] Abplanalp, M. J., Gozem, S., Johnson, R. N., **Shingledecker, C. N.**, Kaiser, R. I., Non-Adiabatic Reaction Dynamics Prompted Formation of Complex Organic Molecules (COMs) in Insterstellar Ices. *Nature Astronomy*, 2019, submitted

[4] McGuire, B. A., Brogan, C. L., Hunter, T. R., Remijan, A. J., Blake, G. A., Burkhardt, A. M., Carroll, P. B., van Dishoeck, E. F., Garrod, R. T., Linnartz, H., **Shingledecker, C. N.**, & Willis, E. R., First Results of an ALMA Band 10 Spectral Line Survey of NGC 6334I: Detections of Glycolaldehyde ($HC(O)CH_2OH$) and a New Compact Bipolar Outflow in HDO and CS. *Astrophysical Journal, letters*, 2018, 863, 2

[3] McGuire, B. A., Burkhardt, A. M., Kalenskii, S., **Shingledecker, C. N.**, Remijan, A. J., Herbst, E., & McCarthy, M. C., Detection of the aromatic molecule benzonitrile ($c\text{-}C_6H_5CN$) in the interstellar medium. *Science*, 2018, 359, 6372

[2] McGuire, B. A., Burkhardt, A. M., **Shingledecker, C. N.**, Kalenskii, S., Herbst, E., Remijan, A. J., & McCarthy, M. C., Detection of Interstellar HC_5O in TMC-1 with the Green Bank Telescope. *Astrophysical Journal, letters*, 2017, 843, 2

[1] Abplanalp, M. J., Gozem, S., Krylov, A. I., **Shingledecker, C. N.**, Herbst, E., & Kaiser, R. I., A study of interstellar aldehydes and enols as tracers of a cosmic ray-driven nonequilibrium synthesis of complex organic molecules. *Proceedings of the National Academy of Sciences*, 2016, 113, 28

Conference Proceedings

[9] **Shingledecker, C. N.**, Vasyunin, A., Herbst, E., & Caselli, P., Radiation Chemistry in Astrochemical Models: From the Lab to the ISM. *IAU Symposium #350: Laboratory Astrophysics, from Observation to Interpretation*, 2019, 350

[8] Burkhardt, A. M., **Shingledecker, C. N.**, Le Gal, R. A., McGuire, B. A., Remijan, A. J., & Herbst, E., Modeling Shock Chemistry in Isolated Molecular Outflows. *American Astronomical Society Meeting Abstracts #233*, 2019, 233

[7] McGuire, B. A., Brogan, C. L., Hunter, T. R., Remijan, A. J., Blake, G., Burkhardt, A. M., Carroll, P. B., van Dishoeck, E., Garrod, R. T., Linnartz, H., **Shingledecker, C. N.**, & Willis, E. R., The Chemistry and Dynamics of Star-forming Regions Revealed with ALMA at Band 10: Water (HDO) Outflows and Complex Organic Line Forests with 300 au Resolution. *American Astronomical Society Meeting Abstracts #233*, 2019, 233

[6] McGuire, B. A., Burkhardt, A. M., Kalenskii, S., **Shingledecker, C. N.**, Remijan, A. J., Herbst, E., & McCarthy, M. C., Detection of Interstellar Benzonitrile (c-C_6H_5CN). *73rd International Symposium on Molecular Spectroscopy*, 2018

[5] **Shingledecker, C. N.**, Tennis, J. D., Le Gal, R. A., & Herbst, E., Cosmic Ray-Driven Radiation Chemistry in Cold Interstellar Environments. *73rd International Symposium on Molecular Spectroscopy*, 2018

[4] Burkhardt, A: M., **Shingledecker, C. N.**, Herbst, E., Kalenskii, S., McCarthy, M. C., Remijan, A. J., & McGuire, B. A., New Carbon-Chain Molecular Detections in TMC-1 with the Green Bank Telescope. *73rd International Symposium on Molecular Spectroscopy*, 2018

[3] **Shingledecker, C. N.** & Herbst, E., A New Model of the Chemistry of Ionizing Radiation in Solids. *72nd International Symposium on Molecular Spectroscopy*, 2017

[2] Burkhardt, A. M., **Shingledecker, C. N.**, Le Gal, R. A., McGuire, B. A., Remijan, A. J., & Herbst, E., Time-Sensitive Chemical Tracers Within Shocked Astrophysical Sources. *72nd International Symposium on Molecular Spectroscopy*, 2017

[1] Burkhardt, A. M., Dollhopf, N. M., Corby, J. F., Carroll, P. B., **Shingledecker, C. N.**, Loomis, R. A., Booth, S. T., Blake, G. A., Remijan, A. J., & McGuire, B. A., Carma Observations of L1157: Chemical Complexity in the Shocked Outflow. *71st International Symposium on Molecular Spectroscopy*, 2016

White Papers

[1] McGuire, B. A., Bergin, E., Blake, G. A., Burkhardt, A. M., Cleeves, L. I., Loomis, R. A., Remijan, A. J., **Shingledecker, C. N.**, & Willis, E. R., Observing the Effects of Chemistry on Exoplanets and Planet Formation. *Science with an ngVLA*, 2018

Other Publications

[2] McGuire, B. A., **Shingledecker, C. N.**, Willis, E. R., Burkhardt, A. M., El-Abd, S., Motiyenko, R. A., Brogan, C. L., Hunter, T. R., Margules, L., Guillemin, J. C., Garrod, R. T., Herbst, E., & Remijan, A. J., VizieR Online Data Catalog: CH_3OCH_2OH ALMA detection in NGC 6334I, 2018

[1] **Shingledecker, C. N.**, Thermally Induced Chemistry of Meteoritic Complex Organic Molecules: A New Heat-Diffusion Model for the Atmospheric Entry of Meteorites. *Arxiv e-Prints*, 2014

Selected Invited Talks, Colloquia, and Seminars

Apr. 2022 **On the Origin of Life: A Scientific Perspective**, *Invited Talk*, The Origin of Life and Nature Before Sin: Scientific and Theological Perspectives, Pontifical University of St. Thomas Aquinas (Angelicum).
Rome, Italy

Apr. 2021 **Modeling cosmic ices in the JWST era**, *Mid-America Regional Astrophysics Conference (MARAC)*, Invited Keynote Address.
Virtual

Mar. 2021 **New methods for simulating astrophysical ices in the JWST era**, *Invited Talk*, American Physical Society Marth Meeting, Mar. 15th 19th 2021.
Virtual

Jan. 2021 **Modeling cosmic-ray-driven grain chemistry in the JWST-Era**, *Invited Conference Talk*, 43^{rd} COSPAR Scientific Assembly, International Convention Centre.
Virtual

May 2020 **Cosmic Rays and Grain Chemistry in Star- and Planet-forming Regions**, *Invited Talk*, Astrochemistry Discussions Series.
Virtual

May. 2020 **Cosmic Rays in Astrochemical Models**, *Invited Talk*, Astrochemistry Webinar Series, American Vacuum Society, UCF Chapter Seminar Series.
Virtual

Oct. 2019 **A Tour of the Molecular Universe**, *Special Joint Physics/Chemistry Seminar*, Old Dominion University, Host: Peter Bernath.
Norfolk, VA

Oct. 2019 **Modeling Dust-grain Ice Mantles in the JWST Era**, *NRAO/UVa Colloquium*, Host: Scott Ransom, National Radio Astronomy Observatory.
Charlottesville, VA

Sep. 2019 **New Frontiers in Astrochemical Modeling**, *Institute Colloquium*, Host: Victor Rivilla, INAF-Osservatorio Astrofisico di Arcetri.
Florence, Italy

Mar. 2019 **Astrochemistry: A story of how molecules are made and destroyed in space**, *Institute Colloquium*, Host: Johannes Kästner, Institute for Theoretical Chemistry: University of Stuttgart.
Stuttgart, Germany

Nov. 2018 **Simulating Cosmic Ray-Driven Processes in Astrochemical Models: How and Why**, *SFB 956 Colloquium*, Universität zu Köln: Physikalische Institute, Host: Stephan Schlemmer.
Cologne, Germany

Oct. 2018 **Radiation chemistry: a vital element for the accurate chemical modeling of star and planet-forming regions**, *MPE-ESO Star and Planet Formation Seminar*, ESO, Host: Anna Miotello.
Munich, Germany

Oct. 2018 **The Role of Cosmic Ray-Driven Processes in Interstellar Ices**, *CAS Seminar*, Max Planck Institute for Extraterrestrial Physics, Host: Paola Caselli.
Munich, Germany

Sep. 2018 **The importance of radiation chemistry in star and planet-forming regions**, *MPE-ESO Journal Club*, Max Planck Institute for Extraterrestrial Physics, Host: Felipe Alves.
Munich, Germany

June 2017 **Cosmic Rays Bite the Dust: An Introduction to the CIRIS Model**, *Invited talk*, Wellesley College, Host: Christopher Arumainayagam.
Wellesley, MA, USA

May 2017 **Modeling Cosmic Ray Induced Interstellar Chemistry**, *Tuesday UVa/NRAO Astronomy (TUNA) Lunch Talk Series*, NRAO, Host: Kristina Nyland.
Charlottesville, VA, USA

Selected Other Conference Talks and Posters

May 2021 **Forming the Molecular Building-blocks of Life on Icy Cosmic Dust**, *Talk*, 2021 Society of Catholic Scientists Annual Conference, Washington DC Hilton.
Washington, DC

Jun. 2020 **Understanding Isomers in Interstellar Environments**, *Talk*, Astrochemical Frontiers: Quarantine Edition.
Virtual

Jun. 2019 **Simulating Ion-Irradiation Experiments Using Astrochemical Models**, *Talk*, From Nanometers to Megaparsecs: A Symposium in Honor of John Black, Chalmers University.
Gothenburg, Sweden

Apr. 2019 **Radiation Chemistry in Astrochemical Models: From the Lab to the ISM**, *Poster*, IAU Symposium on Laboratory Astrophysics, Jesus College, University of Cambridge.
Cambridge, UK

Dec. 2018 **Radiation Chemistry: The Latest Refuge of the Scoundrel?**, *Talk*, CAS Retreat, Schloss Ringberg.
Kreuth, Germany

Sep. 2018 **Solid-Phase Cosmic Ray-Driven Radiation Chemistry in Astrochemical Models**, *Poster*, COST Action CM1401: Our Astro-Chemical History, Hof van Saksen.
Nooitgedacht, Netherlands

Jun. 2018 **Cosmic Ray-Driven Radiation Chemistry in Cold Interstellar Environments**, *Talk*, International Symposium on Molecular Spectroscopy, University of Illinois - Urbana-Champaign.
Urbana-Champaign, IL, USA

May 2018 **Cosmic ray-driven radiation chemistry in astrochemical models**, *Poster*, Cosmic Rays: The Salt of the Star Formation, Osservatorio Astrofisico di Arcetri.
Florence, Italy

Jun. 2017 **A New Model of the Chemistry of Ionizing Radiation in Solids**, *Talk*, International Symposium on Molecular Spectroscopy, University of Illinois - Urbana-Champaign.
Urbana-Champaign, IL, USA

Jun. 2017 **Cosmic Irradiation of Interstellar Ices as a Means of Forming Prebiotic Molecules**, *Talk*, Astrobiology Graduate Conference, University of Virginia.
Charlottesville, VA, USA

Jun. 2017 **PWR Winner Presentation: Europan Ice Irradiation as a Mechanism of Prebiotic Molecule Synthesis**, *Talk*, Astrobiology Graduate Conference, University of Virginia.
Charlottesville, VA, USA

Apr. 2017 **Simulating the chemistry of ionizing radiation in solids**, *Poster*, American Chemical Society 253rd National Meeting, Moscone Center.
San Francisco, CA, USA

Feb. 2015 **Cosmic-ray Induced Interstellar Grain Chemistry: A New Microscopic Monte Carlo Approach**, *Poster*, Second Workshop on Experimental Laboratory Astrophysics, Poipu Beach.
Kauai, HI, USA

Jul. 2014 **Temperature Gradients in Meteorites During Atmospheric Entry**, *Poster*, Astrobiology Graduate Conference, Rensselaer Polytechnic Institute.
Troy, NY, USA

Apr. 2013 **Analysis of the Chemistry of Protoplanetary Disks: The Search for the Water Snow-line**, *Talk*, Distinguished Majors Symposium, University of Virginia.
Charlottesville, VA, USA

Languages

English **Fluent** *Native speaker*

German **Intermediate** *Reading and speaking*

French **Basic** *Reading and some speaking*

References

Ref. 1 **Prof. Dr. Eric Herbst**, *Commonwealth Professor of Chemistry, Astronomy, and Physics*, Department of Chemistry, University of Virginia, Charlottesville, VA 22904.
tel: +1 434-243-0535 email: eh2ef@virginia.edu

Ref. 2 **Prof. Dr. Paola Caselli**, *Managing Director and Group Leader: Center for Astrochemical Studies*, Max Planck Institute for Extraterrestrial Physics, Gießenbachstraße 1, 85748 Garching bei München, Deutschland.
tel: +49 89 30000-3399 email: caselli@mpe.mpg.de

Ref. 3 **Prof. Dr. Christopher R. Arumainayagam**, *Professor of Chemistry*, Department of Chemistry, Wellesley College, Wellesley, MA 02481.
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