

Brian C. Ferrari

✉ b.c.ferrari@lic.leidenuniv.nl • 🌐 <https://cavenfish.github.io/>
🌐 <https://github.com/Cavenfish>

Education

Ph.D. Chemistry <i>Leiden University, Leiden, NL</i>	2022–Present
M.Sc. Physics <i>University of Central Florida, Orlando, FL</i>	2019–2022
B.S. Physics, minor in Mathematics <i>University of Central Florida, Orlando, FL</i>	2014–2018

Awards

- 2022** • HRSMC Conference Poster Prize
- 2020** • Conference Travel Award (UCF CRT52-324)
- 2019** • outReach for the Stars Award
 - FL-AVS Short Course on Surface Science & Nano-materials 1st Place Award
- 2018** • Society of Physics Students Chapter Research Award
 - Conference Travel Award (UCF CRT50-493)
- 2016** • Award for Outstanding Leadership in Physics Outreach at UCF

Professional Experience

Research History.....

Graduate Research Assistant **2022 – Present**
Advisor: Dr. Thanja Lamberts *Leiden Institute of Chemistry*

- Simulating vibrational energy dissipation in CO ices

NASA MUREP Fellow **2020 – 2022**
Advisor: Drs. Scott Sandford & Michel Nuevo *NASA Ames Research Center*

- Collecting Raman spectra of refractory residues produced via UV irradiation of astrophysical ices
- Utilizing data science techniques to identify trends in IR and Raman spectra of refractory residues

Graduate Research Assistant **2019–2022**
Advisor: Dr. Christopher J. Bennett *University of Central Florida*

- Inducing chemical changes in astrophysical ices via keV electron irradiation
- Detecting radiation products with IR spectroscopy and mass spectrometry
- Measuring yields from electron stimulated desorption of astrophysical ices
- Utilizing quantum chemistry software to predict the spectroscopic properties of small molecules
- Utilizing density functional theory to predict the spectroscopic properties of bulk phase molecules

Undergraduate Research Assistant

2016–2018

Advisor: Dr. Christopher J. Bennett

University of Central Florida

- Assembling ultra-high vacuum (UHV) chamber
- Designing and machining UHV-grade sample holder and radiation shield
- Utilizing quantum chemistry software to predict the spectroscopic properties of small molecules

Employment History

Graduate Teaching Assistant

2019–2020

Supervisor: Physics Dept.

University of Central Florida

Undergraduate Teaching Assistant

2017–2018

Supervisor: Physics Dept.

University of Central Florida

Machinist Apprentice

2016–2018

Supervisor: Robert Wong

University of Central Florida

Leadership

Student Chapter Chairman

2019–2021

American Vacuum Society at the University of Central Florida

External Funding

Period	Short Title	Amount
2023	LKBF Travel Support	€600.00
2020–2023	NASA MUREP Fellowship	\$165,000.00
2020–2021	FSGC Dissertation Improvement Fellowship	\$4,000.00
2017–2018	SPS Chapter Research Grant	\$2,000.00
Total:		\$171,000.00 €600.00

Publications

Citations: 29 \diamond h-index: 3 \diamond i10-index: 1 (March 2022 using Google Scholar)

[1] **Brian C. Ferrari**, G. Molpeceres, J. Kästner, Y. Aikawa, M. van Hemert, J. Meyer, and T. Lamberts. Floating in space: How to treat the weak interaction between co molecules in interstellar ices. *ACS Earth and Space Chemistry*, 7(7):1423–1432, 2023.

[2] **Brian C. Ferrari**, K. Slavicinska, and C. J. Bennett. Role of suprathemal chemistry on the evolution of carbon oxides and organics within interstellar and cometary ices. *Accounts of Chemical Research*, pages 1181–1189, 2021.

[3] **Brian C. Ferrari** and C. J. Bennett. A computational investigation of the equilibrium geometries, energetics, vibrational frequencies, infrared intensities and raman activities of c_2o_y ($y = 3, 4$) species. *Molecular Physics*, page e1837404, 2020.

- [4] **Brian C. Ferrari** and C. J. Bennett. A comparison of medium-sized basis sets for the prediction of geometries, vibrational frequencies, infrared intensities and raman activities for water. *Journal of Physics: Conference Series*, 1290:012013, 2019.
- [5] **Brian C. Ferrari**. AutoGAMESS: A Python package for automation of GAMESS(US) Raman calculations. *Journal of Open Source Software*, 4(41):1612, 2019.
- [6] R. C. Fortenberry, D. Peters, **Brian C. Ferrari**, and C. J. Bennett. Rovibrational spectral analysis of CO₃ and C₂O₃: Potential sources for O₂ observed in comet 67P/churyumov–gerasimenko. *The Astrophysical Journal*, 886(1):L10, 2019.

Conference Experience

Invited Talks.....

- [1] **Brian C. Ferrari**, G. Molpeceres, J. Kästner, Y. Aikawa, M. van Hemert, J. Meyer, and T. Lamberts. Floating in space: How to treat the weak interaction between co molecules in interstellar ices. *Max Planck Institute for Extraterrestrial Physics Seminar*, 2024.
- [2] **Brian C. Ferrari**, G. Molpeceres, J. Kästner, Y. Aikawa, M. van Hemert, J. Meyer, and T. Lamberts. Floating in space: How to treat the weak interaction between co molecules in interstellar ices. *Radboud University Nijmegen Theoretical Chemistry Seminar*, 2023.

Contributed Talks.....

- [1] **Brian C. Ferrari**, M. van Hemert, J. Meyer, and T. Lamberts. Exploring the mysteries of co ices: Weak interactions and vibrational energy relaxation. *Presented at the Workshop on Interstellar Matter*, 2023.
- [2] **Brian C. Ferrari**, K. Slavicinska, and C. J. Bennett. Electron irradiation of astrophysical ice analogues: implications for the formations of biomolecules on enceladus. *Presented at Florida Chapter of American Vacuum Society Symposium*, 2020.

Workshops.....

I lead two workshops at the UCF Raspberry Jam for an audience of high school, undergraduate and graduate students. Topics were taught at an introductory level and geared towards helping students learn to use Raspberry Pi micro-controllers

- **Brian C. Ferrari**. Digital Logic Circuits Workshop. *UCF Raspberry Jam*, Oct 2018.
- **Brian C. Ferrari**. Introductory Python Coding Workshop. *UCF Raspberry Jam*, Oct 2018.

Posters.....

- [1] **Brian C. Ferrari**, F. Sies, M. C. van Hemert, J. Meyer, and T. Lamberts. Vibrational energy dissipation in carbon monoxide ices: A tale of four isotopes. *Poster Session of Astrochemistry meets Surface Science: Theoretical Frontiers*, 2022.
- [2] **Brian C. Ferrari**, G. Molpeceres, J. Kästner, Y. Aikawa, M. van Hemert, J. Meyer, and T. Lamberts. Floating in space: How to treat the weak interaction between co molecules in interstellar ices. *Poster Session of the Holland Research School of Molecular Chemistry Symposium*, 2022.

[3] **Brian C. Ferrari**, K. Slavicinska, and C. J. Bennett. The search for novel carbon oxides within irradiated CO₂ ices: Potential new parent species for cometary volatiles. *Poster Session of the 52nd meeting of the AAS Division of Planetary Sciences*, 2020.

[4] **Brian C. Ferrari**, N. F. Aguirre, and C. J. Bennett. Experimental study of methane fragmentation and recombination from low energy electron interactions. *Poster Session of the Florida Chapter of American Vacuum Society Symposium*, 2019.

[5] **Brian C. Ferrari** and C. J. Bennett. A comparison of medium-sized basis sets for the prediction of geometries, vibrational frequencies, infrared intensities and raman activities of water. *Poster Session of the 30th annual Conference on Computational Physics*, 2018.

Organizing.....

UCF AVS Astrochemistry Webinar **2020**
https://ucf.avs.org/astrochem *Webinar Series*

- Attendees from 4 continents, and over 20 different universities.
- Audience was diverse group of students, faculty, and research center scientists

UCF Raspberry Jam **2018**
Short Course

- Attendees from 3 different Florida universities and 2 industry companies
- Audience was diverse group of industry professionals, undergraduate and graduate students

Laboratory Skills

Proficient.....

- Operating, handling and assembling UHV equipment
- IR and Raman spectroscopy techniques
- Mass spectrometry (QMS + TPD)
- Designing and Machining UVH-Grade Parts

Competent.....

- Scanning Electron Microscopy (SEM) Techniques
- Focused Ion Beam (FIB) Etching

Computer Skills

Programming Languages.....

Advanced Julia, Python, JavaScript
Intermediate C/C++, Fortran, Solidity
Novice Mathematica, HTML, CSS/Less

Software.....

* GAMESS(US) * CP2K * VMD * MacMolPlt * SLURM * OpenMP * MPI * Inkscape
* MASsoft * OMNIC * LabSpec * LabVIEW * SolidWorks * L^AT_EX

Teaching Assistant Experience

Course	Role	Sections
○ Physical Science	Grader	– 2
○ Physics 1 for Scientists and Engineers	Grader	– 2
○ Physics 2 for Scientists and Engineers	Studio/Scale-up TA	– 3
	Lab and Recitation Instructor	– 1
○ College Physics 1	Lab and Recitation Instructor	– 2
○ College Physics 2	Studio/Scale-up TA	– 1
	Grader	– 1
○ ‘Leren Onderzoeken’ 1 (Learn Research)	Supervisor	– 2
○ ‘Practicum Basisvaardigheden’ (Intro Chem Lab)	Apparatus Room Supervisor	– 4

Outreach Activities

Event	Role	# Times
○ STEM Day	Performed Physics “Super Powers” Demonstrations	– 5
○ Career Day	Performed Physics “Super Powers” Demonstrations	– 5

Mentoring

Undergraduate Students Mentored.....

Carla-Louise Chadourne (LIC), Riley Havel (UCF), Remington Cantelas (UCF), Sarah Swiersz (UCF), Gabriel Martínez (Inter PR)

Hobbies and Interest

Gardening * Hiking * Kayaking * Bouldering * Rollerblading * Soccer * Volleyball * Running
* Reading