

# Brian C. Ferrari

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<https://github.com/Cavenfish>

Citizenship: American (USA) and Brazilian (Dual-Citizen)

## Education

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

## Awards

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- 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

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### Research History

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**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
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

## Publications

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

- [1] **Brian C. Ferarri**, 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.
- [2] **Brian C. Ferarri** 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.
- [3] **Brian C. Ferarri** 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.
- [4] **Brian C. Ferarri**. AutoGAMESS: A Python package for automation of GAMESS(US) Raman calculations. *Journal of Open Source Software*, 4(41):1612, 2019.

- [5] R. C. Fortenberry, D. Peters, **Brian C. Ferarri**, and C. J. Bennett. Rovibrational spectral analysis of  $\text{CO}_3$  and  $\text{C}_2\text{O}_3$ : Potential sources for  $\text{O}_2$  observed in comet 67P/churyumov–gerasimenko. *The Astrophysical Journal*, 886(1):L10, 2019.

## Conference Experience

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### Talks

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- [1] **Brian C. Ferarri**, K. Slavicinska, and C. J. Bennett. Electron irradiation of astrophysical ice analogues: implications for the formations of biomolecules on enceladus. In *Presented at Florida Chapter of American Vacuum Society Symposium*, 2020.

### Workshops

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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

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- [1] **Brian C. Ferarri**, K. Slavicinska, and C. J. Bennett. The search for novel carbon oxides within irradiated  $\text{CO}_2$  ices: Potential new parent species for cometary volatiles. In *Poster Session of the 52nd meeting of the AAS Division of Planetary Sciences*, 2020.
- [2] **Brian C. Ferarri**, N. F. Aguirre, and C. J. Bennett. Experimental study of methane fragmentation and recombination from low energy electron interactions. In *Poster Session of the Florida Chapter of American Vacuum Society Symposium*, 2019.
- [3] **Brian C. Ferarri** 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. In *Poster Session of the 30th annual Conference on Computational Physics*, 2018.

### Organizing

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#### 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

<https://sites.google.com/site/ucfraspberrjam/home>

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

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### 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

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### Programming Languages.....

**Advanced** Python, JavaScript

**Intermediate** Julia, Fortran, Solidity, C/C++

**Novice** Mathematica, Shell Scripting, HTML, CSS/Less

### Software.....

\* GAMESS(US) \* CP2K \* VMD \* MacMolPlt \* SLURM \* OpenMP \* MPI \* Inkscape  
\* MASsoft \* OMNIC \* LabSpec \* LabVIEW \* SolidWorks \* L<sup>A</sup>T<sub>E</sub>X

## Teaching Assistant Experience

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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 Lab and Recitation Instructor	– 3 – 1
○ College Physics 1	Lab and Recitation Instructor	– 2
○ College Physics 2	Studio/Scale-up TA Grader	– 1 – 1

## Outreach Activities

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

## Mentoring

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### Undergraduate Students Mentored.....

Riley Havel (UCF), Remington Cantelas (UCF), Sarah Swiersz (UCF), Gabriel Martínez (Inter PR)

## Hobbies and Interest

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