

# Ben K. D. Pearce

benkdpearce.com

## Research Interests

-Origins of life  
-Prebiotic chemistry  
-The RNA world  
-Meteoritic organics

## Contact Information

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## Education

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### **Ph.D. in Physics and Astronomy – Astrobiology**

Expected Completion: August 2021  
McMaster University, Hamilton, ON, Canada

Sept 2017 – present

### **M.Sc. in Physics and Astronomy – Astrobiology (GPA: 11.3/12)**

McMaster University, Hamilton, ON, Canada

Sept 2015 – Jul 2017

### **B.Sc. in Astronomy (with Distinction – Avg: 87%)**

University of British Columbia, Vancouver, BC, Canada

Sept 2012 – Apr 2015

### **B.Sc. in Software Engineering (GPA: 2.8/4)**

Schulich School of Engineering, University of Calgary, Calgary, AB, Canada

Sept 2005 – Apr 2010

## Publications

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**Pearce, B. K. D.**, Tupper, A. S., Pudritz, R. E., & Higgs, P. G. 2018. Constraining the Time Interval for the Origin of Life on Earth. *Astrobiology*, **18**, 343–364

**Pearce, B. K. D.**, Pudritz, R. E., Semenov, D. A., & Henning, Th. 2017. Origin of the RNA World: The Fate of Nucleobases in Warm Little Ponds. *Proceedings of the National Academy of Sciences USA*, **114**, 11327–11332 (**Cozzarelli Prize Winner**)

**Pearce, B. K. D.**, & Pudritz, R. E. 2016. Meteorites and the RNA World: A Thermodynamic Model of Nucleobase Synthesis within Planetesimals. *Astrobiology*, **16**, 853–872

Cobb, A. K., Pudritz, R. E., & **Pearce, B. K. D.** 2015. Nature's Starships II: Simulating the Synthesis of Amino Acids in Meteorite Parent Bodies. *The Astrophysical Journal*, **809**, 6

**Pearce, B. K. D.**, & Pudritz, R. E. 2015. Seeding the Pregenetic Earth: Meteoritic Abundances of Nucleobases and Potential Reaction Pathways. *The Astrophysical Journal*, **807**, 85

## Employment

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### **Graduate Researcher**

Supervisor: Dr. Ralph Pudritz  
Origins Institute, McMaster University, Hamilton, ON, Canada

Sept 2015 – Present

- Theoretical research on the origin of the RNA world via meteorite-delivered organics to warm little ponds.

**Presenter** Sept 2015 – Present  
William J. McCallion Planetarium and Origins Institute 3D Theatre  
McMaster University, Hamilton, ON, Canada

- Development and presentation of a variety of public and private astronomy- and physics-based shows using planetarium and 3D theatre software.

**Visiting Graduate Researcher** May 2016 – July 2016  
Supervisors: Dr. Thomas Henning, Dr. Oliver Trapp  
Max Planck Institute of Astronomy and Heidelberg University, Heidelberg, Germany

- Theoretical research on the fate of nucleobases in warm little ponds and theoretical and experimental research on the formation of nucleotides in such environments.

**Summer Research Student** May 2015 – Sept 2015  
Supervisor: Dr. Aaron Boley  
University of British Columbia, Vancouver, BC, Canada

- Hydrodynamics simulations of chondrule formation via planetesimal collision shockwaves.

**Summer Research Student** May 2014 – Aug 2014  
Supervisor: Dr. Ralph Pudritz  
Origins Institute, McMaster University, Hamilton, ON, Canada

- Thermodynamic simulations of amino acid formation in planetesimals.

## **Presentations**

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**Origin of the RNA World: The Fate of Nucleobases in Warm Little Ponds**  
Pearce, B. K. D., Pudritz, R. E., Semenov, D. A., and Henning, Th.  
Oral Presentation, Science of Early Life Conference June 2018  
McMaster University, Hamilton, ON, Canada

**Origin of the RNA World: The Fate of Nucleobases in Warm Little Ponds**  
Pearce, B. K. D., Pudritz, R. E., Semenov, D. A., and Henning, Th.  
Poster Presentation, Origins of Life Gordon Research Conference and Seminar Jan 2018  
Gavelston, TX, USA

**Steps to the RNA World: Nucleobase Survival and Evolution in Warm Little Ponds**  
Pearce, B. K. D., Pudritz, R. E., Semenov, D. A., and Henning, Th.  
Oral Presentation, Astrobiology Science Conference (AbSciCon 2017) April 2017  
Mesa, AZ, USA

**The Survival and Accumulation of Genetic Precursors Delivered to Warm Little Ponds on Early Terrestrial Planets**  
Pearce, B. K. D., Pudritz, R. E., Semenov, D. A., and Henning, Th.  
Oral Presentation, Physics & Astronomy Graduate Student Symposium Day Oct 2016  
McMaster University, Hamilton, ON, Canada

**Meteorites and the RNA World**  
Pearce, B. K. D., and Pudritz, R. E.  
Oral Presentation, Planet and Star Formation Seminar May 2016  
Max Planck Institute of Astronomy, Heidelberg, Germany

## **How Nucleobases Formed in Asteroids and Comets: Simulating 15 Candidate Reaction Pathways**

Pearce, B. K. D., and Pudritz, R. E.

Oral Presentation, Astrobiology Science Conference (AbSciCon 2015)

June 2015

Chicago, IL, USA

## **Nature's Starships: Simulating the Synthesis of Amino Acids in Meteorite Parent Bodies**

Pearce, B. K. D., Cobb, A. K., and Pudritz, R. E.

Oral Presentation, Canadian Undergraduate Physics Conference (CUPC 2014)

Oct 2014

Queen's University, Kingston, ON, Canada

## **Teaching Experience**

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### **Teaching Assistant**

Sept 2017 – April 2018

ASTR 1FO3: Introduction to Astronomy and Astrophysics, BIOPHYS 3D03: Origins of Life,

ASTR 2E03: Planetary Astronomy, ASTR 2B03: Big Questions

McMaster University, Hamilton, ON, Canada

### **Teaching Assistant**

Sept 2016 – April 2017

BIOPHYS 3D03: Origins of Life, ASTR 2E03: Planetary Astronomy, ASTR 2B03: Big Questions

McMaster University, Hamilton, ON, Canada

### **Tutor**

Sept 2016 – Dec 2016

Physics Drop-in Centre

McMaster University, Hamilton, ON, Canada

### **Teaching Assistant**

Sept 2015 – April 2016

PHYS 1E03: Waves, Electricity and Magnetic Fields, ASTR 2B03: Big Questions, PHYS 1A03:

Introductory Physics

McMaster University, Hamilton, ON, Canada

### **Mentor**

October 2014 – Present

McMaster University, Hamilton, ON, Canada

University of British Columbia, Vancouver, BC, Canada

- Providing educational and career guidance to a variety of undergraduate and entering graduate students.

### **Teaching Assistant**

Jan 2014 – Dec 2014

MATH 110: Differential Calculus, MATH 101: Integral Calculus with Applications to Physical Sciences

University of British Columbia, Vancouver, BC, Canada

## **Academic Awards and Honours**

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- PNAS Cozzarelli prize Class I for paper exhibiting outstanding scientific excellence and originality, February 2018.
- NSERC Postgraduate Scholarship-Doctoral (PGS-D), September 2017. **\$63,000**.
- Best Talk at McMaster Physics & Astronomy Graduate Student Symposium Day, Oct 2016. **\$20**.

- Joseph and Joanne Lee Ontario Graduate Scholarship (OGS), September 2016. **\$15,000.**
- NSERC Canada Graduate Scholarship-Michael Smith Foreign Study Supplement (CGS-MSFSS), May 2016. **\$5,300.**
- NSERC Alexander Graham Bell Canada Graduate Scholarship-Master's (CGS-M), September 2015. **\$17,500.**
- NSERC Undergraduate Student Research Award (USRA), May 2015. **\$8,800.**
- Paul Sykes Scholarship in Astronomy, September 2014. **\$100.**
- NSERC CREATE undergraduate student research fellowship in the Canadian Astrobiology Training Program (CATP), May 2014. **\$1,000.**
- NSERC Undergraduate Student Research Award (USRA), May 2014. **\$8,400.**
- Dean's Honour List, Sept 2012 – May 2014.

## Service

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### **Seminar Organizer** Sept 2017 – Present

Astrobiology Journal Club

Origins Institute, McMaster University, Hamilton, ON

- Scheduling speakers, advertising seminar, moderating discussion.

### **Graduate Student Gripe Session Organizer** Sept 2016 – Present

Physics & Astronomy Department

McMaster University, Hamilton, ON

- Planning and executing an annual session for graduate students to air their grievances about the department, teaching assistantships, and graduate life.
- Acting as a liaison between graduate students and the department Chair to address issues.

### **Committee Member** June 2017 – Dec 2017

Selection Committee for an Associate Dean of Graduate Studies (Science)

McMaster University, Hamilton, ON

- Participate in the interviewing of candidates and the selection of an Associate Dean of Graduate Studies for the Faculty of Science.

### **Committee Member** July 2015 – Sept 2017

Space Exploration Topical Team in Astrobiology

Canadian Space Agency (CSA)

- Making recommendations for the astrobiology-focussed questions, tasks, and celestial targets around which CSA's future space exploration missions should be centered.

### **President** March 2014 – March 2015

Astronomy Club

University of British Columbia, Vancouver, BC, Canada

- Overseeing of UBC Astronomy Club operations, organization of outreach events, delegation of tasks to the 4 Vice Presidents and 16 supporting positions, running of weekly meetings, and presentation of talks at club and student outreach events.

### **Summer Radio Telescope Volunteer** May 2013 – July 2013

Physics and Astronomy Department

University of British Columbia, Vancouver, BC, Canada

- Design and performance of tests to characterize the 2.1m-diameter radio telescope tracking

issues.

**Lead Audio/Visual Volunteer** May 2013  
2013 Canadian Astronomical Society (CASCA) Annual (3-day) Meeting  
University of British Columbia, Vancouver, BC, Canada

- Scheduling and training of audio/visual volunteers, and monitoring and controlling of auditorium lights, sound, projectors and microphones before, during and after presentations.

## **Outreach**

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**Invited Panelist** March 2018  
Astronomy & Space Exploration Society Discussion Panel: 'Is Anybody Out There?'  
University of Toronto, Toronto, ON

**Invited Scientist** Dec 2017  
CBC Quirks and Quarks  
Toronto, ON

**Co-organizer** Sept 2017 – Present  
Science on Tap  
Local Pubs, Hamilton, ON

**Invited Speaker** March 2016, Feb 2018  
Undergraduate astronomy groups  
McMaster University, Hamilton, ON

**Invited Scientist** Nov 2017  
St James Elementary School  
Mississauga, ON

**Origins Institute Twitter Account Moderator** October 2016 – Present  
Astrobiology Grads (@McMAstroBio)  
Origins Institute, McMaster University, Hamilton, ON

**Organizer** Sept 2014  
Astronomy Education Night for the Canadian Association for Girls in Science  
University of British Columbia, Vancouver, BC, Canada

## **Professional Development**

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**Summer Astronomical Instrumentation School** Aug 2013  
Dunlap Institute of Astronomy and Astrophysics, Toronto, ON, Canada