

Curriculum Vitae  
Colin J. Joyce  
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**Education:**

- Graduated with a PHD in Physics from the University of New Hampshire in December 2016 with a GPA of 3.48/4.0.
- Graduated Summa Cum Laude from University of New Hampshire with a B.S. in Physics with Astronomy option in May 2011 with GPA of 3.75/4.0..

**Publications:           h-index=10**

1. Joyce, C. J. , P. A. Isenberg, C. W. Smith, N. Murphy and N. A. Schwadron, Excitation of Low-Frequency Waves in the Solar Wind by Newborn Interstellar He<sup>+</sup>, *The Astrophysical Journal* (2010).
2. Joyce, C. J., C. W. Smith, P. A. Isenberg, N. Murphy, S. P. Gary, and L. F. Burlaga, Observation of Bernstein Waves Excited by Newborn Interstellar Pickup Ions in the Solar Wind, *The Astrophysical Journal* (2011).
3. Joyce, C. J., et al. (2013), Validation of PREDICCS using LRO/CRaTER observations during three major solar events in 2012, *Space Weather*, 11, 350–360, doi:[10.1002/swe.20059](https://doi.org/10.1002/swe.20059).
4. Joyce, C. J. et al. (2014), Radiation modeling in the Earth and Mars atmospheres using LRO/CRaTER with the EMMREM Module, *Space Weather*, 12, 2, 112-119, doi: [10.1002/2013SW000997](https://doi.org/10.1002/2013SW000997).
5. Joyce, C. J., et al. (2015), Analysis of the potential radiation hazard of the 23 July 2012 SEP event observed by STEREO A using the EMMREM model and LRO/CRaTER, *Space Weather*, 13, 560–567, doi:[10.1002/2015SW001208](https://doi.org/10.1002/2015SW001208).
6. Joyce, C. J. et al., (2016), Atmospheric radiation modeling of galactic cosmic rays using LRO/CRaTER and the EMMREM model with comparisons to balloon and airline based measurements, *Space Weather*, 14, 659-667, doi:[10.1002/2016SW001425](https://doi.org/10.1002/2016SW001425).
7. C. W. Smith, P. A. Isenberg, C. J. Joyce, B. E. Cannon, N. Murphy, R. G. Nuno, and N. A. Schwadron, Ulysses and Voyager Observations of Waves Due to Interstellar Pickup H<sup>+</sup> and He<sup>+</sup>, *Proceedings of Ninth Annual International Astrophysics Conference: Pickup Ions Throughout the Heliosphere and Beyond*, (2010).
8. Schwadron, N. A., et al. (2012), Lunar radiation environment and space weathering from the Cosmic Ray Telescope for the Effects of Radiation (CRaTER), *J. Geophys. Res.*, 117, E00H13, doi:[10.1029/2011JE003978](https://doi.org/10.1029/2011JE003978).
9. Cannon, B. E., Smith, C. W., Isenberg, P. A., Vasquez, B. J., Joyce, C. J., Murphy, N., and Nuno, R. G., 2013, Preliminary analysis of magnetic waves due

to newborn interstellar pickup ions, *Solar Wind 13*, AIP Conf. Proc. 1539, 334–337.

10. Jordan, A. P., T. J. Stubbs, C. J. Joyce, N. A. Schwadron, H. E. Spence, and J. K. Wilson (2013), The formation of molecular hydrogen from water ice in the lunar regolith by energetic charged particles, *J. Geophys. Res. Planets*, 118, 1257–1264, doi:[10.1002/jgre.20095](https://doi.org/10.1002/jgre.20095).
11. Spence, H. E., M. J. Golightly, C. J. Joyce, M. D. Looper, N. A. Schwadron, S. S. Smith, L. W. Townsend, J. Wilson, and C. Zeitlin (2013), Relative contributions of galactic cosmic rays and lunar proton “albedo” to dose and dose rates near the Moon, *Space Weather*, 11, doi:[10.1002/2013SW000995](https://doi.org/10.1002/2013SW000995).
12. Schwadron, N. A., et al. (2014), Does the worsening galactic cosmic radiation environment observed by CRaTER preclude future manned deep space exploration?, *Space Weather*, 12, 11, 622-632, doi:[10.1002/2014SW001084](https://doi.org/10.1002/2014SW001084).
13. Jordan, A. P., Stubbs, T. J., Wilson, J. K., Schwadron, N. A., Spence, H. E., Joyce, C. J., (2014), Deep dielectric charging of regolith within the Moon's permanently shadowed regions, *JGR Planets*, 119, 8, 1806-1821.
14. Cannon, B. E., Smith, C. W., Isenberg, P. A., Vasquez, B. J., Joyce, C. J., Murphy, N., and Nuno, R. G., (2014), Ulysses Observations of Magnetic Waves Due to Newborn Interstellar Pickup Ions. II. Application of Turbulence Concepts to Limiting Wave Energy and Observability, *Astrophys. J.*, 787, 2.
15. Argal, M. et al. (2015), ACE Observations of Magnetic Waves Arising from Newborn Interstellar Pickup Helium Ions, *Geophysical Research Letters*, 42, 9617–9623, doi:[10.1002/2015GL066374](https://doi.org/10.1002/2015GL066374).
16. Zeitlin, C. et al (2016), Solar modulation of the deep space galactic cosmic ray lineal energy spectrum measured by CRaTER, 2009–2014, *Space Weather*, 14, 247–258, doi:[10.1002/2015SW001314](https://doi.org/10.1002/2015SW001314).
17. Clements, E. B. et al. (2016), Interplanetary space weather effects on lunar reconnaissance orbiter avalanche photodiode performance, *Space Weather*, doi:[10.1002/2016SW001381](https://doi.org/10.1002/2016SW001381).
18. Fisher, M. K., Argall, M. R., Joyce, C. J., Smith, C. W., Isenberg, P. A., Vasquez, B. J., Schwadron, N. A., Skoug, R. M., Sokol J. M., Bzowski, M., Zurbuchen, T. H., & Gilbert, J. A. 2016, *ApJ*, 830, 47.
19. Aggarwal, P. et al. (2016), Voyager Observations of Magnetic Waves Due to Newborn Interstellar Pickup Ions: 2–6 au, *The Astrophysical Journal*, 822:94, doi:[10.3847/0004-637X/822/2/94](https://doi.org/10.3847/0004-637X/822/2/94).
20. Cannon, B. E. et al. (2017), Listing of 502 Times When the Ulysses Magnetic Fields Instrument Observed Waves Due to Newborn Interstellar Pickup Protons, *The Astrophysical Journal*, 840, 1.

21. Quinn, P. R., et al. (2017), Modeling the effectiveness of shielding in the earth-moon-mars radiation environment using PREDICCS: five solar events in 2012, *J. Space Weather Space Clim.*, 7, A16, doi:10.1051/swsc/2017014.
22. Schwadron, N. A., et al. (2017), Particle Radiation Sources, Propagation and Interactions in Deep Space, at Earth, the Moon, Mars, and Beyond: Examples of Radiation Interactions and Effects, *Space Science Reviews*, 1572-9672, doi:10.1007/s11214-017-0381-5.
23. Smith, C. W., et al. (2017), Observations of Low-Frequency Magnetic Waves due to Newborn Interstellar Pickup Ions Using ACE, Ulysses, and Voyager Data *J. Phys.: Conf. Ser.* 900 012018.
24. Schwadron, N. A., et al. (2018), Update on the worsening particle radiation environment observed by CRaTER and implications for future human deep-space exploration, *Space Weather*, 16, 289-303, doi:10.1002/2017SW001803.
25. Winslow, R. M, et al. (2018), Opening a Window on ICME-driven GCR Modulation in the Inner Solar System, *The Astrophysical Journal*, 856, 2, doi:10.3847/1538-4357/aab098.
26. Hollick, S. J., et al. (2018), Magnetic Waves Excited by Newborn Interstellar Pickup Ions Measured by the Voyager Spacecraft from 1 to 45 au. I. Wave Properties, *The Astrophysical Journal*, 863, 75, doi:10.3847/1538-4357/aac83b.
27. Hollick, S. J., et al. (2018), Magnetic Waves Excited by Newborn Interstellar Pickup Ions Measured by the Voyager Spacecraft from 1 to 45 au. II. Instability and Turbulence Analyses, *The Astrophysical Journal*, 863, 75, doi:10.3847/1538-4357/aac839.

**Invited Talks:**

1. "Voyager and ACE Observations of Waves Due to Interstellar Pickup He<sup>+</sup>," C. W. Smith, C. J. Joyce, P. A. Isenberg, N. Murphy and N. A. Schwadron, Ninth Annual International Astrophysics Conference: Pickup Ions Throughout the Heliosphere and Beyond (Maui, Hawaii), March 2010.
2. "Radiation Environments for future human exploration throughout the solar system," N. A. Schwadron, M. Gorby, J. Linker, P. Riley, T. Torok, C. Downs, H. Spence, M. Desai, Z. Mikic, C. Joyce, K. Kozarev, and L. Townsend, Fall AGU (San Francisco, CA), December 2016.
3. "Observations of Low-Frequency Magnetic Waves due to Newborn Interstellar Pickup Ions Using ACE, Ulysses, and Voyager," C. W. Smith, et al. Sixteenth Annual International Astrophysics Conference 2017 - Turbulence, Structures, and Particle Acceleration Throughout the Heliosphere and Beyond (Santa Fe), March 2017

**Contributed Talks/Posters:**

1. "Search for Low-Frequency Waves due to Interstellar Pickup Protons and the Opportunity to do Solar Wind Turbulence in the Process," C. J. Joyce, C. W. Smith,

- P. A. Isenberg, and N. Murphy, SHINE Workshop (Wolfville, Nova Scotia), August 2009.
2. "Observation of Low-Frequency Waves due to Interstellar Pickup He<sup>+</sup>," C. J. Joyce, C. W. Smith, P. A. Isenberg, N. Murphy, and N. A. Schwadron (presented by C. W. Smith), Fall Meeting of the American Geophysical Union (San Francisco), December 2009.
  3. "Excitation of Low-Frequency Waves in the Solar Wind by Newborn Interstellar Pickup Ions H<sup>+</sup> and He<sup>+</sup> as Seen by Voyager at 4.5 AU," C. W. Smith et al., Joint Meeting of ACE, STEREO, SOHO, and WIND In-Situ Science Teams (Kennebunkport, ME), June 2010.
  4. "Excitation of Low-Frequency Waves by Newborn Interstellar Pickup Ions H<sup>+</sup> and He<sup>+</sup> at 4.5 AU," C. J. Joyce, C. W. Smith, P. A. Isenberg, N. Murphy, and N. A. Schwadron, SHINE (Santa Fe, NM), July 2010.
  5. "Observation of High-Frequency Waves in the Solar Wind Excited by Newborn Interstellar Pickup Ions," C. J. Joyce, C. W. Smith, Philip A. Isenberg, Neil Murphy, and S. Peter Gary, SHINE (Snowmass, Colorado), July 2011.
  6. "Validation of PREDICCS Using LRO/CRaTER Observations During Three Major Solar Events in 2012," C. J. Joyce et al., LPSC (Woodlands, TX), March 2013.
  7. "Validation of the PREDICCS Radiation System Using LRO/CRaTER Observations During Three Major Solar Events in 2012," C. J. Joyce, et al., LSF (virtual conference), July 2013.
  8. "Characterization of the Earth-Moon-Mars Radiation Environment during the LRO Mission using CRaTER and PREDICCS," C. J. Joyce, et al., SHINE (Telluride, Colorado), June 2014.
  9. "Analysis of the potential radiation hazard of the 23 July 2012 SEP event observed by STEREO A using the EMMREM model and LRO/CRaTER," C. J. Joyce, et al., SHINE (Stowe, Vermont), July 2015.
  10. "Analysis of the Longitudinal Variation of Energetic Particle Radiation during the 23 July 2012 Solar Event Using STEREO and LRO/CRaTER with the BRYNTRN Model," C. J. Joyce, et al., Fall AGU, December 2015.
  11. "Atmospheric radiation modeling of galactic cosmic rays using LRO/CRaTER and the EMMREM model with comparisons to balloon and airline based measurements," C. J. Joyce, et al., SHINE (Santa Fe), July 2016.
  12. "Atmospheric radiation modeling of galactic cosmic rays using LRO/CRaTER and the EMMREM model with comparisons to balloon and airline based measurements," C. J. Joyce, et al., Fall AGU, December 2016.
  13. "Assessing the Current Status of Atmospheric Radiation Modelling: Progress, Challenges and the Needs for the Next Generation of Models," C. J. Joyce, et al., Fall AGU, December 2017.

**Awards:**

- University of New Hampshire scholarship, September 2007.
- NASA RHG-Exceptional Achievement for Science Team, 9 April 2013.
- NASA Group Achievement Award, 2 June 2015.
- University of New Hampshire Graduate Student Research/Scholarship/Creativity Award, 11 April 2016

**Research Experience:**

- Performed Undergraduate Research in Space Physics.  
Advisor: Dr. Charles W. Smith, January 2009 – May 2011
  - Developed numerous graphics codes to plot Voyager data.
  - Developed new ingest codes for Voyager processing.
  - Processed Voyager data using spectral codes in search of waves due to interstellar pickup ions.
  - Applied theoretical concepts for wave excitation and turbulent cascade to description of observations.
- Performed Graduate Research in Space Physics.  
Advisor: Dr. Nathan A. Schwadron, June 2011 – December 2016.
  - Developed codes for analyzing data from the CRaTER instrument and microdosimeter aboard the Lunar Reconnaissance Orbiter, producing data products including dose rates, dose equivalent rates, LET spectra and event lists for use on the CRaTER website.
  - Modelled atmospheric and interplanetary radiation and energetic particle transport using the EMMREM model.
  - Provided validation of EMMREM radiation model using CRaTER measurements.
  - Used modulation theory to model galactic cosmic rays.
  - Provided support as coauthor for multiple publications by analyzing CRaTER data and modelling radiation and transport of energetic particles.
- Post-doctoral research in Space Physics.  
Supervisor: Dr. Nathan A. Schwadron, January 2017-present.
  - Provided operational support for the ISOIS instrument suite on Parker Solar Probe as part of the ISOIS Science Operation Center at UNH.
  - Provided backup operational support for the IBEX spacecraft.
  - Provided data analysis support using CRaTER data for energetic particle radiation studies.
  - Provided data analysis and modelling support for studies of waves excited by newborn interstellar pickup waves using data from ACE, Messenger, Ulysses and Voyager.

**Professional Societies:**

- Member of American Geophysical Union 2009-present