
Department of Physics and Astronomy
University of Texas at San Antonio
Southwest Research Institute
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ROBERT C. ALLEN

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RESEARCH INTERESTS

My research interests lie in collisionless plasma phenomena. This includes wave-particle interactions, the sources and evolution of magnetospheric plasma, and space flight instrumentation. Previous experience includes Electromagnetic Ion Cyclotron (EMIC) wave generation and propagation in the Earth's Magnetosphere through both *in situ* data analysis and model comparisons. Current work involves a comparative study between plasma sources and subsequent evolution between the magnetospheres of Earth and Saturn.

EDUCATION

In Progress	Ph.D.	Physics, The University of Texas at San Antonio/SwRI	
2011	B.S.	Physics, The University of Texas at Arlington <i>with a minor in Mathematics.</i>	Cum Laude

EMPLOYMENT

- **Graduate Research Assistant**, January 2014 - Present
The University of Texas at San Antonio with Southwest Research Institute
Supervisor: Prof. Stefano Livi
Modeling and calibration of the HIS instrument onboard Solar Orbiter. Investigating the penetration and evolution of solar wind and ionospheric oxygen ions in the magnetospheres of Earth and Saturn. Work on internal R&D projects. Fabrication of various lab equipment and wiring for calibration of flight hardware.
- **Research Assistant**, June 2011 - November 2013
The University of New Hampshire
Supervisor: Prof. Lynn Kistler
Investigating the location, causes, and impacts of Electromagnetic Ion Cyclotron (EMIC) waves in the Earth's Magnetosphere. Developing a software package to read in situ Cluster and Van Allen Probes magnetometer and electric field data to generate spectrograms of various wave properties and characteristics, accompanied with local plasma data, solar wind, and geomagnetic activity information. This information is used for several case studies as well as a statistical study of the magnetic latitude dependence of various EMIC wave properties and off-equator generation regions due to Shabansky orbits. In addition, ground based magnetometers have been utilized to trace the waves to the ground. Responsibilities also included mentoring new graduate students in the lab to introduce them to space physics research and teach them how to access and employ the various software and data sets used by the group.
- **Undergraduate Research Assistant**, February 2008 - May 2011
The University of Texas at Arlington
Supervisors: Prof. Ramon E. Lopez (February 2008 - May 2011), Prof. Yue Deng (August 2010 - May 2011), and Prof. Stephen Pankavich (August 2009 - May 2010)
Utilized various databases to collect and analyze satellite, magnetometer, and SuperDARN data. Conducted studies on the polar cap ionospheric environment using various interments on board Defense Meteorological Satellite Program (DMSP) spacecrafts. Also, worked with CISM_DX to analyze Lyon-Fedder-Mobarry (LFM) global Magnetohydrodynamics (MHD) simulation results and ran the Weimer-2005 simulation for various projects. Studies also included the stability properties of BGK wave solutions to a one-dimensional Vlasov-Poisson system. Additional responsibilities included mentoring newer undergraduate researchers..

ORAL PRESENTATIONS

- A statistical study of EMIC waves observed by Cluster: June 2015
 Exploring the importance of Shabansky orbits
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker,
 M. W. Dunlop, M. André, and V. K. Jordanova
 Geospace Environment Modeling Workshop
- Tutorial: Solar and Heliospheric Missions and Measurements June 2014
 Robert C. Allen
 SHINE Conference
- A statistical study of EMIC waves observed by Cluster June 2014
 1. Wave properties
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker,
 M. W. Dunlop, M. André, and V. K. Jordanova
 Geospace Environment Modeling Workshop
- A statistical study of EMIC waves observed by Cluster June 2014
 2. Associated plasma conditions
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker,
 M. W. Dunlop, M. André, and V. K. Jordanova
 Geospace Environment Modeling Workshop
- Spatial distribution and properties of EMIC waves observed by Cluster June 2013
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker,
 M. W. Dunlop, and M. André
 Geospace Environment Modeling Workshop
- Multiple Bidirectional EMIC waves observed by Cluster at middle magnetic latitudes in the dayside magnetosphere June 2013
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker,
 M. W. Dunlop, and M. André
 Geospace Environment Modeling Workshop
- Comparison of Two EMIC Waves and Their Associated Plasma Conditions June 2012
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, C. G. Mouikis, G. Wang
 Geospace Environment Modeling Workshop
- Comparison of Two EMIC Waves with Linear Theory June 2012
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, C. G. Mouikis, G. Wang
 Geospace Environment Modeling Workshop
- Variations of the Polar Cap Boundary Location Based on Solar Wind Parameters October 2010
 Robert C. Allen, Sophia Cockrell, Bethany Hiller, Perla Gonzalez, Ramon E. Lopez
 Joint Fall 2010 Meeting of the Texas Sections of the APS, AAPT, and SPS
- Instability of BGK Waves in a Model of Plasma Dynamics August 2010
 Robert C. Allen and Stephen Pankavich
 The Mathematical Association of America's (MAA) MathFest
- Instability of BGK Waves in a Model of Plasma Dynamics March 2010
 Robert C. Allen and Stephen Pankavich
 Center for Undergraduate Research in Mathematics (CURM) Spring Conference
- The Effect of Large By on Currents in the Polar Cap October 2009
 Robert C. Allen, Sophia J. Cockrell, Ramon E. Lopez,
 Dustin Brewer, Elizabeth J. Mitchell
 Joint Fall 2009 Meeting of the Texas Sections of the APS, AAPT, and SPS

A Table of Ionospheric Boundaries and Solar Wind Conditions April 2009
 Robert C. Allen, Jorge Landivar, Ramon E. Lopez
 Joint Spring 2009 Meeting of the Texas Sections of the APS, AAPT, and SPS

POSTER PRESENTATIONS

Variations of Oxygen Charge State Abundance in the Global Magnetosphere June 2015
 Robert C. Allen and S. A. Livi
 Geospace Environment Modeling Workshop

Average spatial distributions of oxygen charge states in the global magnetosphere: December 2014
 as observed by Polar
 Robert C. Allen and S. A. Livi
 AGU Fall Meeting

Student involvement in the Geospace Environment Modeling (GEM) workshop December 2014
 Robert C. Allen and I. Cohen
 AGU Fall Meeting

Heavy Ion Sensor (HIS): The importance of minor ion measurements as a probe of the Sun June 2014
 Robert C. Allen and S. Livi
 SHINE conference

Average spatial distributions of oxygen charge states in the global magnetosphere, June 2014
 as observed by Polar
 Robert C. Allen and S Livi
 Geospace Environment Modeling Workshop

Spatial distribution and properties of EMIC waves observed by Cluster June 2013
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker,
 M. W. Dunlop
 Geospace Environment Modeling Workshop

Multiple Bidirectional EMIC waves observed by Cluster at middle magnetic June 2013
 latitudes in the dayside magnetosphere
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker,
 M. W. Dunlop, M. André
 Geospace Environment Modeling Workshop

EMIC Waves and Associated Plasma Conditions June 2012
 Robert C. Allen, J. -C. Zhang, L. M. Kistler, C. G. Mouikis, G. Wang
 Geospace Environment Modeling Workshop

LIST OF PUBLICATIONS

1. **Allen, R. C.**, S. A. Livi, and J. Goldstein, Variations of oxygen charge state abundances in the global magnetosphere, as observed by Polar, *J. Geophys. Res. Space Physics*, [To be submitted].
2. Saikin, A. A., J. -C. Zhang, **R. C. Allen**, C. W. Smith, L. M. Kistler, H. E. Spence, R. B. Torbert, C. A. Kletzing, and V. K. Jordanova, The occurrence, spatial distribution, and wave properties of H⁺-, He⁺-, and O⁺-band EMIC waves observed by the Van Allen Probes, *J. Geophys. Res. Space Physics*, [Submitted].
3. **Allen, R. C.**, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker, M. W. Dunlop, M. André, and V. K. Jordanova, A statistical study of EMIC waves observed by Cluster: 2. Associated plasma conditions, *J. Geophys. Res. Space Physics*, [Submitted].

4. **Allen, R. C.**, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, B. Klecker, M. W. Dunlop, M. André, and V. K. Jordanova (2015), A statistical study of EMIC waves observed by Cluster: 1. Wave properties, *J. Geophys. Res. Space Physics*, 120, doi:10.1002/2015JA021333.
5. S. Pankavich and **R. C. Allen** (2014), Instability of some Periodic BGK Waves for the Vlasov-Poisson system, *European Physical Journal D.*, doi: 10.1140/epjd/e2014-50170-y.
6. Zhang J.-C., A. A. Saikin, L. M. Kistler, C. W. Smith, H. E. Spence, C. G. Mouikis, R. B. Torbert, B. A. Larsen, G. D. Reeves, R. M. Skoug, H. O. Funsten, W. S. Kurth, C. A. Kletzing, **R. C. Allen**, and V. K. Jordanova (2014), Excitation of EMIC waves detected by the Van Allen Probes on 28 April 2013, *Geophys. Res. Lett.*, 41, doi: 10.1002/2014GL060621.
7. Lin, R. -L., J. -C. Zhang, **R. C. Allen**, L. M. Kistler, C. G. Mouikis, J. -C. Gong, S. -Q. Liu, L. -Q. Shi, B. Klecker, J. -A. Sauvaud, and M. W. Dunlop (2013), Testing linear theory of EMIC waves in the inner magnetosphere: Cluster observations, *J. Geophys. Res. Space Physics*, 119, doi:10.1002/2013JA019541.
8. **Allen, R. C.**, J. -C. Zhang, L. M. Kistler, H. E. Spence, R. -L. Lin, M. W. Dunlop, and M. André (2013), Multiple bidirectional EMIC waves observed by Cluster at middle magnetic latitudes in the dayside magnetosphere, *J. Geophys. Res. Space Physics*, 118, doi:10.1002/jgra.50600.
9. Huang, Y., Y. Deng, J. Lei, A. Ridley, R. E. Lopez, **R. C. Allen**, and B. M. Butler (2011), Comparison of Joule heating associated with high-speed solar wind between different models and observations, *JASTP*, doi:10.1016/j.jastp.2011.05.013.
10. Mitchell, E. J., R. E. Lopez, R. J. Bruntz, M. Wiltberger, J. G. Lyon, **R. C. Allen**, S. J. Cockrell, and P. L. Whittlesey (2010), Saturation of transpolar potential for large Y component interplanetary magnetic field, *J. Geophys. Res.*, 115, A06201, doi:10.1029/2009JA015119.

TEACHING EXPERIENCE

Lab Instructor

University of New Hampshire (January 2012-May 2012)

- PHYS 405/406: *Intro to Modern Astronomy Lab*, 1 section, Spring 2012

University of Texas at Arlington (August 2009-May 2011)

- PHYS 1445: *Astronomy I Lab*, 2 sections, Spring 2011
- PHYS 1446: *Astronomy II Lab*, 2 sections, Spring 2011
- PHYS 1446: *Astronomy II Lab*, 3 sections, Fall 2010
- PHYS 1445: *Astronomy I Lab*, 2 sections, Spring 2010
- PHYS 1446: *Astronomy II Lab*, 1 section, Spring 2010
- PHYS 1445: *Astronomy I Lab*, 1 section, Fall 2009
- PHYS 1446: *Astronomy II Lab*, 1 section, Fall 2009

PROFESSIONAL MEMBERSHIPS

- The American Geophysical Union (AGU)
- The Honor Society of Phi Kappa Phi (Inducted: 03/29/15)
- Alpha Chi Honor Society (Inducted: 02/22/15)
- The Golden Key International Honour Society (Inducted: 10/08/14)
- Sigma Pi Sigma (Inducted: 11/29/10)

SCHOLARSHIPS AND AWARDS

- *Keith W. Tompkins Scholarship*, The University of Texas at Arlington Department of Physics, 2010
- *Keith W. Tompkins Scholarship*, The University of Texas at Arlington Department of Physics, 2009

PROFESSIONAL SERVICE

- **Organizational Offices Held:**
 - **Graduate Program Website Admin**, July 2015 - Present
Southwest Research Institute and University of Texas at San Antonio Joint Program
 - **Student Representative**, June 2014 - June 2016
Geospace Environment Modeling (GEM) Workshop, NSF
 - **Writing Club Officer**, May 2015 - May 2016
Graduate Society of Physics Students, The University of Texas at San Antonio
 - **Outreach Officer**, January 2015 - May 2015
Graduate Society of Physics Students, The University of Texas at San Antonio
 - **Society of Physics Students Liaison (Founding Officer)**, October 2014 - May 2015
Graduate Society of Physics Students, The University of Texas at San Antonio
 - **Vice-President**, May 2010 - May 2011
Society of Physics Students, The University of Texas at Arlington
 - **President**, May 2009 - May 2010
Society of Physics Students, The University of Texas at Arlington
 - **Secretary**, May 2008 - May 2009
Society of Physics Students, The University of Texas at Arlington

REFERENCES

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|-------------------------|---|------------------------------|
| 1. Prof Stefano Livi | SwRI/The University of Texas at San Antonio | <i>stefano.livi@swri.edu</i> |
| 2. Prof. Lynn Kistler | The University of New Hampshire | <i>lynn.kistler@unh.edu</i> |
| 3. Dr. Jichun Zhang | The University of New Hampshire | <i>jichun.zhang@unh.edu</i> |
| 4. Prof. Ramon E. Lopez | The University of Texas at Arlington | <i>relopez@uta.edu</i> |