

# ADRIAN ILDEFONSO

## CURRICULUM VITAE

iadrian@gatech.edu • <https://www.adrianildefonso.com> • US Citizen • Updated: May 4, 2019

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### EDUCATION

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- PhD in Electrical and Computer Engineering** May 2017 – Present  
*Georgia Institute of Technology* – GPA: 4.0 / 4.0  
**Topics:** radiation effects in silicon-germanium devices, circuits and systems; utilizing pulsed lasers to emulate the effects of heavy ions on space systems.  
**Advisor:** Dr. John D. Cressler
- MS in Electrical and Computer Engineering** August 2014 – May 2017  
*Georgia Institute of Technology* – GPA: 4.0 / 4.0  
**Thesis Title:** “An Assessment of Complementary Silicon-Germanium BiCMOS Technologies for Extreme Environment Applications”  
**Advisor:** Dr. John D. Cressler
- Bachelor of Science in Computer Engineering** August 2009 – May 2014  
*University of Puerto Rico – Mayagüez Campus* – GPA: 4.0 / 4.0
- Stefani Rafucci Award (Highest Honor at UPRM)
  - Computer Engineering Department Award
  - Faculty of Engineering Award

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### RESEARCH EXPERIENCE

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- Graduate Research Assistant – SiGe Devices and Circuits Team** August 2014 – Present  
*Georgia Institute of Technology* *Atlanta, GA*
- Currently studying the effects of radiation on electronic devices, circuits, and systems, with a focus on RF systems
  - Designed schematic and layout of DC and AC test structures, analog circuits, and various RF circuits using Cadence Virtuoso including ultra-wide temperature bandgap reference circuits, current-feedback amplifiers, operational amplifiers, low noise amplifiers, mixers, and RF power detectors
  - Completed over ten tapeouts in most major Silicon Germanium (SiGe) platforms including GlobalFoundries’ 8HP and 9HP, Jazz SBC18H3, and IHP SG25H3P
  - Performed a variety of RF measurements including scattering parameters, linearity, load and source pull, and noise figure
  - Characterized devices and circuits over a wide temperature range, using closed and open cycle cryostats, down to 77K
  - Developed TCAD models for multiple platforms of SiGe HBTs to simulate radiation effects at the device, circuit, and system level through the use of mixed-mode simulations
  - Have overseen the planning and execution of off-site radiation experiments utilizing different sources
  - Have accumulated over 1,000 hours of radiation effects testing across several facilities including:
    - Naval Research Laboratory (two-photon absorption laser and total dose using X-rays)
    - Lawrence Berkeley National Laboratory (heavy-ion broadbeam)
    - Vanderbilt University (total dose using X-rays)
    - Argonne National Laboratory (microbeam X-rays)
    - Grand Accélérateur National d’Ions Lourds (GANIL) in Caen, France (heavy-ion broadbeam)
    - GSI Helmholtz Centre for Heavy Ion Research in Darmstadt, Germany (heavy-ion microbeam)
- Undergraduate Research (SURE Program)** Summer 2012  
*Georgia Institute of Technology* *Atlanta, GA*
- Developed and calibrated TCAD models to study the effect of radiation on n-type MOSFETs
  - Measured DC transfer and output characteristics of n-type MOSFETs over temperature (from 77K to 300K)
- Topic:** Development of TCAD Models for Extreme Environment Studies  
**Advisor:** Dr. John D. Cressler
- Undergraduate Research** January 2012 – May 2014  
*University of Puerto Rico – Mayagüez Campus* *Mayagüez, PR*
- Designed custom layout for annular transistor DC structures using Cadence Virtuoso
  - Wrote software to automate the characterization of DC test structures and extracting various device parameters
- Topic:** Model Extraction of MOSFET using annular geometries for radiation active environments  
**Advisor:** Dr. Gladys O. Ducoudray

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**TEACHING EXPERIENCE**

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**Guest Lecturer (CoE3002)** October 2018  
*Georgia Institute of Technology* Atlanta, GA

- Introduced engineering students to basic semiconductor physics concepts including energy bandgap, carrier densities, and effective mass approximation

**Graduate Teaching Assistant (ECE3741)** August 2014 – May 2015  
*Georgia Institute of Technology* Atlanta, GA

- Terms: Fall 2014, Spring 2015
- Taught over 150 non-ECE students about different electronics topics in an interactive laboratory setting
- Designed and graded quizzes, tests and laboratory experiments to verify students' understanding of the material

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**INDUSTRY EXPERIENCE**

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**Naval Research Enterprise Internship Program (NREIP)** June 2018 – Aug 2018  
*Naval Research Laboratory* Washington DC

- Performed two-photon absorption experiments and improved calibration procedure for laser system
- Performed TCAD simulations on GaN HEMTs

**Naval Research Enterprise Internship Program (NREIP)** June 2017 – Aug 2017  
*Naval Research Laboratory* Washington DC

- Performed two-photon absorption experiments using a pulsed-laser system to emulate the effects of heavy ions on electronic devices and circuits
- Performed energy calibration and knife-edge measurements to determine beam spot size

**Intern – Advanced Imaging Group** Summer 2014  
*MIT Lincoln Laboratory* Lexington, MA

- Performed testing on imaging circuits in order to characterize their performance
- Implemented test benches in an FPGA using VHDL in order to automate the test procedure

**Webmaster – iap.ece.uprm.edu** August 2013 – May 2014  
*University of Puerto Rico – Mayagüez Campus* Mayagüez, PR

- Updated front-end and back-end to provide a better user experience
- Added features to maintain the administrative part of the program

**Design Engineering Intern – Drivers and Load Switches Group** Summer 2013  
*Texas Instruments* Dallas, TX

- Designed a clamp to keep a load switch from turning on when there is a fast transient on the input
- Performed ESD simulations for various products under development which identified violations that were later fixed
- Wrote Python scripts to generate Verilog-a code needed for simulations and to parse the results

**IT Intern (Developer/Programmer – IT Legal Team)** Summer 2011  
*Verizon Wireless* Bedminster, NJ

- Used Test Driven Development to build a template engine for a framework used to interview prospective developers
- Assisted in new-hire interviewing process for IT Legal Team Java developers

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**ADMINISTRATIVE EXPERIENCE**

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**Lab Manager – SiGe Devices and Circuits Team** May 2016 – May 2017  
*Georgia Institute of Technology* Atlanta, GA

- Managed laboratory equipment and oversaw day-to-day operations of a graduate research lab with 20 students
- Interfaced with industry sponsors for a variety of research needs
- Handled equipment purchase and repairs worth > \$20K

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**SKILLS**

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- **Languages:** Spanish and English (fully bilingual), French (intermediate)
- **Technical Languages:** HTML, CSS, Java, JavaScript, XML, Python, SQL, SPICE, PHP, VHDL, LaTeX, Matlab, C
- **Software Tools:** Eclipse IDE, LTSpice, LabView, NanoTCAD, Sentaurus, Cadence Virtuoso, Eagle CAD, Sonnet, ADS
- **Lab Techniques:** Packaging and wirebonding, wafer probing, DC device characterization, RF measurements (s-parameters, noise figure, linearity, source/load pull), over-temperature measurements, modeling of semiconductor devices, radiation experiments

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## EXTRACURRICULAR ACTIVITIES AND VOLUNTEER WORK

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- **ECE Graduate Student Organization** (Member 2015 – 2017, Vice President 2017 – 2018, President 2018 – present)
- **IEEE** (Student Member 2012 – Present)
- **Focus Program (2015, 2016, 2017)** (Volunteer) – Activity geared towards encouraging underrepresented minority students to pursue graduate education
- **Annual Latino College and STEM Fair (2016, 2019)** (Volunteer) – Activity geared towards K-12 Hispanic/Latino students and their families where attendees can learn about different college majors and programs of study
- **Tau Beta Pi – PR Alpha Chapter** (Member 2012 – May 2014)
- **Star Program (2010, 2011, 2012, 2013)** (Volunteer) – Activity geared towards encouraging high school students to pursue a career in engineering
- **Engineering Workshop (2011, 2012)** (Volunteer) – Activity geared towards educating high school students on specific engineering disciplines
- **Eugene Francis Cup 2011, 2012** (Volunteer) – Math competition for high school students hosted at UPRM
- **IEEEExtreme 4.0 (2010), 5.0 (2011), 6.0 (2012)** (Competitor) – Programming competition held by IEEE
- **IEEE Computer Society, IEEE Women In Engineering** (Student Member 2009 – 2014)
- **Calculus Competition 2010, 2011** Obtained 4th place at the competition held at UPRM. Was the only freshman selected to form part of the UPRM Calculus Team
- **Programming Competition UPR – Ponce 2012** – 1st Place

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## HONORS AND AWARDS

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- Outstanding Conference Paper Award and Best Student Paper Award - 2018 IEEE Nuclear and Space Radiation Effects Conference
- Georgia Tech Leadership Fellow 2018
- IEEE NPSS Paul Phelps Continuing Education Grant 2018
- IEEE NPSS Graduate Scholarship 2018
- Science Alliance Leadership Training (SALT) Fellow of the New York Academy of Sciences 2017
- NSF Fellow 2015
- Goizueta Foundation Fellow 2015, 2017
- GEM Fellow 2014
- Best Presentation Award – Industrial Affiliates Program Research Presentations (April 2013)
- Georgia Institute of Technology FOCUS Scholar (2012, 2014)
- Verizon Foundation Scholar (2010 – 2014)

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## PEER-REVIEWED JOURNAL PUBLICATIONS

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1. A. Cardoso, A. Omprakash, P. Chakraborty, N. Karaulac, D. Fleischhauer, **A. Ildefonso**, S. Zeinolabedinzadeh, M. Oakley, T. Bantu, N. Lourenco, and J. Cressler, “On the Cryogenic RF Linearity of SiGe HBTs in a Fourth-Generation 90-nm SiGe BiCMOS Technology,” *IEEE Trans. Electron Devices*, vol. 62, no. 4, pp. 1127–1135, Apr. 2015.
2. Z. Fleetwood, N. Lourenco, **A. Ildefonso**, T. England, I. Song, R. Schmid, A. Cardoso, S. Jung, N.-H. Roche, A. Khachatryan, S. Buchner, D. McMorrow, J. Warner, P. Paki, and J. Cressler, “An Investigation of the SET Response of Devices and Differential Pairs in a 32-nm SOI CMOS Technology,” *IEEE Trans. Nucl. Sci.*, vol. 62, no. 6, pp. 2643–2649, Dec. 2015.
3. C. T. Coen, A. C. Ulusoy, P. Song, **A. Ildefonso**, M. Kaynak, B. Tillack, and J. D. Cressler, “Design and On-Wafer Characterization of *G*-Band SiGe HBT Low-Noise Amplifiers,” *IEEE Trans. Microw. Theory Techn.*, vol. 64, no. 11, pp. 3631–3642, Nov. 2016.
4. N. E. Lourenco, S. Zeinolabedinzadeh, **A. Ildefonso**, Z. E. Fleetwood, C. T. Coen, I. Song, S. Jung, F. Inanlou, N. J. H. Roche, A. Khachatryan, D. McMorrow, S. P. Buchner, J. H. Warner, P. Paki, and J. D. Cressler, “An Investigation of Single-Event Effect Modeling Techniques for a SiGe RF Low-Noise Amplifier,” *IEEE Trans. Nucl. Sci.*, vol. 63, no. 1, pp. 273–280, Feb. 2016.
5. Z. E. Fleetwood, N. E. Lourenco, **A. Ildefonso**, J. H. Warner, M. T. Wachter, J. M. Hales, G. N. Tzintzarov, N. J. H. Roche, A. Khachatryan, S. P. Buchner, D. McMorrow, P. Paki, and J. D. Cressler, “Using TCAD Modeling to Compare Heavy-Ion and Laser-Induced Single Event Transients in SiGe HBTs,” *IEEE Trans. Nucl. Sci.*, vol. 64, no. 1, pp. 398–405, Jan. 2017.
6. N. E. Lourenco, Z. E. Fleetwood, **A. Ildefonso**, M. T. Wachter, N. J. H. Roche, A. Khachatryan, D. McMorrow, S. P. Buchner, J. H. Warner, H. Itsuji, D. Kobayashi, K. Hirose, P. Paki, A. Raman, and J. D. Cressler, “The Impact of Technology Scaling on the Single-Event Transient Response of SiGe HBTs,” *IEEE Trans. Nucl. Sci.*, vol. 64, no. 1, pp. 406–414, Jan. 2017.
7. A. Omprakash, Z. Fleetwood, U. Raghunathan, **A. Ildefonso**, A. Cardoso, N. Lourenco, J. Babcock, R. Mukhopadhyay, E. X. Zhang, D. Fleetwood, and J. Cressler, “Total Ionizing Dose Effects on a High-Voltage (>30V) Complementary SiGe on SOI Technology,” *IEEE Trans. Nucl. Sci.*, vol. 64, no. 1, pp. 277–284, Jan. 2017.

8. I. Song, M. K. Cho, M. A. Oakley, **A. Ildefonso**, I. Ju, S. P. Buchner, D. McMorrow, P. Paki, and J. D. Cressler, "On the Application of Inverse-Mode SiGe HBTs in RF Receivers for the Mitigation of Single-Event Transients," *IEEE Trans. Nucl. Sci.*, vol. 64, no. 5, pp. 1142–1150, May 2017.
9. **A. Ildefonso**, N. E. Lourenco, Z. E. Fleetwood, M. T. Wachter, G. N. Tzintzarov, A. S. Cardoso, N. J. H. Roche, A. Khachatrian, D. McMorrow, S. P. Buchner, J. H. Warner, P. Paki, M. Kaynak, B. Tillack, and J. D. Cressler, "Single-Event Transient Response of Comparator Pre-Amplifiers in a Complementary SiGe Technology," *IEEE Trans. Nucl. Sci.*, vol. 64, no. 1, pp. 89–96, Jan. 2017.
10. **A. Ildefonso**, I. Song, G. N. Tzintzarov, Z. E. Fleetwood, N. E. Lourenco, M. T. Wachter, and J. D. Cressler, "Modeling Single-Event Transient Propagation in a SiGe BiCMOS Direct-Conversion Receiver," *IEEE Trans. Nucl. Sci.*, vol. 64, no. 8, pp. 2079–2088, Aug. 2017.
11. Z. E. Fleetwood, **A. Ildefonso**, G. N. Tzintzarov, B. Wier, U. Raghunathan, M. K. Cho, I. Song, M. T. Wachter, D. Nergui, A. Khachatrian, J. H. Warner, P. McMarr, H. Hughes, E. Zhang, D. McMorrow, P. Paki, A. Joseph, V. Jain, and J. D. Cressler, "SiGe HBT Profiles With Enhanced Inverse-Mode Operation and Their Impact on Single-Event Transients," *IEEE Trans. Nucl. Sci.*, vol. 65, no. 1, pp. 399–406, Jan. 2018.
12. J. M. Hales, A. Khachatrian, S. Buchner, N. J. Roche, J. Warner, Z. E. Fleetwood, **A. Ildefonso**, J. D. Cressler, V. Ferlet-Cavrois, and D. McMorrow, "Experimental Validation of an Equivalent LET Approach for Correlating Heavy-Ion and Laser-Induced Charge Deposition," *IEEE Transactions on Nuclear Science*, vol. 65, no. 8, pp. 1724–1733, Aug. 2018.
13. N. E. Lourenco, **A. Ildefonso**, G. N. Tzintzarov, Z. E. Fleetwood, K. Motoki, P. Paki, M. Kaynak, and J. D. Cressler, "Single-Event Upset Mitigation in a Complementary SiGe HBT BiCMOS Technology," *IEEE Trans. Nucl. Sci.*, vol. 65, no. 1, pp. 231–238, Jan. 2018.
14. **A. Ildefonso**, C. T. Coen, Z. E. Fleetwood, G. N. Tzintzarov, M. T. Wachter, A. Khachatrian, D. McMorrow, J. H. Warner, P. Paki, and J. D. Cressler, "Utilizing SiGe HBT Power Detectors for Sensing Single-Event Transients in RF Circuits," *IEEE Trans. Nucl. Sci.*, vol. 65, no. 1, pp. 239–248, Jan. 2018.
15. P. S. Goley, G. N. Tzintzarov, S. Zeinolabedinzadeh, **A. Ildefonso**, K. Motoki, R. Jiang, E. X. Zhang, D. M. Fleetwood, L. Zimmermann, M. Kaynak, S. Lischke, C. Mai, and J. D. Cressler, "Total Ionizing Dose Effects in 70-GHz Bandwidth Photodiodes in a SiGe Integrated Photonics Platform," *IEEE Trans. Nucl. Sci.*, vol. 66, no. 1, pp. 125–133, Jan. 2019.
16. A. P. Omprakash, **A. Ildefonso**, Z. E. Fleetwood, G. N. Tzintzarov, A. S. Cardoso, J. A. Babcock, R. Mukhopadhyay, A. Khachatrian, J. H. Warner, D. McMorrow, S. P. Buchner, and J. D. Cressler, "The Effects of Temperature on the Single-Event Transient Response of a High-Voltage ( $> 30$  V) Complementary SiGe-on-SOI Technology," *IEEE Trans. Nucl. Sci.*, vol. 66, no. 1, pp. 389–396, Jan. 2019.
17. **A. Ildefonso**, Z. E. Fleetwood, G. N. Tzintzarov, J. M. Hales, D. Nergui, M. Frounchi, A. Khachatrian, S. P. Buchner, D. McMorrow, J. H. Warner, J. Harms, A. Erickson, K. Voss, V. Ferlet-Cavrois, and J. D. Cressler, "Optimizing Optical Parameters to Facilitate Correlation of Laser- and Heavy-Ion-Induced Single-Event Transients in SiGe HBTs," *IEEE Trans. Nucl. Sci.*, vol. 66, no. 1, pp. 359–367, Jan. 2019.

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#### PEER-REVIEWED CONFERENCE PROCEEDINGS

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1. A. P. Omprakash, P. S. Chakraborty, H. Ying, A. S. Cardoso, **A. Ildefonso**, and J. D. Cressler, On the potential of using SiGe HBTs on SOI to support emerging applications up to 300°C, in *Bipolar/BiCMOS Circuits and Technology Meeting - BCTM, 2015 IEEE*, 2015, pp. 27–30.
2. **A. Ildefonso**, I. Song, Z. Fleetwood, N. E. Lourenco, M. T. Wachter, and J. D. Cressler, Modeling Single-Event Transient Propagation in a SiGe BiCMOS Direct-Conversion Receiver, Radiation Effects on Components and Systems (RADECS) Conference, 2016.
3. M. T. Wachter, **A. Ildefonso**, Z. Fleetwood, N. E. Lourenco, G. Tzintzarov, D. McMorrow, N. J.-H Roche, A. Khachatrian, P. McMarr, H. Hughes, J. H. Warner, P. Paki, and J. D. Cressler, The Effects of Total Ionizing Dose on the Transient Response of SiGe BiCMOS Technologies, Radiation Effects on Components and Systems (RADECS) Conference, 2016.
4. C. T. Coen, **A. Ildefonso**, Z. E. Fleetwood, and J. D. Cressler, A 19–34 GHz SiGe HBT Square-Law Detector with Ultra Low 1/f Noise for Atmospheric Radiometers, Proc. European Microwave Integrated Circuits Conference, 2017, pp. 163–166.
5. A. P. Omprakash, **A. Ildefonso**, G. Tzintzarov, J. Babcock, R. Mukhopadhyay, and J. D. Cressler, Using SiGe-on-SOI HBTs to Build 300°C Capable Analog Circuits, in *2018 IEEE BiCMOS and Compound Semiconductor Integrated Circuits and Technology Symposium (BCICTS)*, Oct. 2018, pp. 206–209.

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#### ORAL AND POSTER PRESENTATIONS

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1. **A. Ildefonso**, N. E. Lourenco, Z. E. Fleetwood, M. T. Wachter, G. N. Tzintzarov, A. S. Cardoso, N. J. H. Roche, A. Khachatrian, D. McMorrow, S. P. Buchner, J. H. Warner, P. Paki, M. Kaynak, B. Tillack, and J. D. Cressler, Single-Event Transient Response of Comparator Pre-Amplifiers in a Complementary SiGe Technology, oral presentation at 2016 *IEEE Nuclear and Space Radiation Effects Conference*, 2016.

2. **A. Ildefonso**, I. Song, Z. Fleetwood, N. E. Lourenco, M. T. Wachter, and J. D. Cressler, Modeling Single-Event Transient Propagation in a SiGe BiCMOS Direct-Conversion Receiver, poster presentation at 2016 *Radiation Effects on Components and Systems Conference (RADECS)*, 2016.
3. **A. Ildefonso**, C. T. Coen, Z. E. Fleetwood, G. N. Tzintzarov, M. T. Wachter, A. Khachatrian, D. Mcmorrow, J. H. Warner, P. Paki, and J. D. Cressler, Utilizing SiGe HBT Power Detectors for Sensing Single-Event Transients in RF Circuits, oral presentation at 2017 *IEEE Nuclear and Space Radiation Effects Conference*, 2017.
4. **A. Ildefonso** and J. D. Cressler, TPA SEE Testing Procedures at NRL: from System Calibration to Experiment, oral presentation at *5th Workshop on Laser Testing of Radiation Effects on Components and Systems*, 2017.
5. **A. Ildefonso** and J. D. Cressler, Radiation Hardening Strategies for SiGe-Based RF Communications Circuits and Systems, oral presentation at 2017 *GOMACTech Conference*, 2018.
6. **A. Ildefonso**, Z. E. Fleetwood, G. N. Tzintzarov, J. M. Hales, D. Nergui, M. Frounchi, A. Khachatrian, S. P. Buchner, D. Mcmorrow, J. H. Warner, J. Harms, A. Erickson, K. Voss, V. Ferlet-Cavrois, and J. D. Cressler, Optimizing Optical Parameters to Facilitate Correlation of Laser- and Heavy-Ion-Induced Single-Event Transients in SiGe HBTs, oral presentation at 2018 *IEEE Nuclear and Space Radiation Effects Conference*, 2018.
7. **A. Ildefonso**, G. N. Tzintzarov, D. Nergui, A. P. Omprakash, H. Ying, and J. D. Cressler, Silicon-Germanium Platforms: An Enabling Technology for Next-Generation Space Systems, poster presentation at the 2018 *Space Innovations Symposium*, 2018.
8. **A. Ildefonso** and J. D. Cressler, Silicon-Germanium Platforms: An Enabling Technology for Next-Generation Space Systems, oral presentation at the 2019 *Exploration and Origins Colloquium*, 2019.

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#### ACADEMIC SERVICE

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- Reviewer for the 2019 Nuclear and Space Radiation Effects Conference (NSREC)
- Reviewer for the IEEE Transactions on Nuclear Science
- Reviewer for the Nuclear Instruments and Methods in Physics Research Journal
- Reviewer for the 2018 SACNAS Conference
- Reviewer for the 2018 SACNAS Conference Travel Scholarship for Undergraduates
- Reviewer for the Goizueta Fellowship at the Georgia Institute of Technology
- Reviewer for Presidential Undergraduate Research Awards at the Georgia Institute of Technology
- Reviewer for the 2016 Radiation Effects on Components and Systems (RADECS) Conference
- Mentored two undergraduate research assistants in the SiGe Devices and Circuits Team