Adrian Ildefonso, Ph.D.

Curriculum Vitae

adrian.ildefonso@ieee.org ● https://www.adrianildefonso.com ● US Citizen

Research Interests

- Radiation effects in electronic devices, circuits, and systems
- Laser-based testing techniques to emulate radiation effects
- Extreme-environment operation of electronic devices, circuits and systems
- Using design techniques to mitigate effects of radiation on electronic systems
- Machine Learning applications in the field of radiation effects
- Designing robust electronic systems for spatially-constrained applications (e.g., CubeSats)

Education

Ph.D. in Electrical and Computer Engineering May 2017 – August 2020
Georgia Institute of Technology – GPA: 4.0 / 4.0
Dissertation: "Characterization and Mitigation of Single-Event Effects in RF Circuits and Systems"
Advisor: Dr. John D. Cressler

M.S. in Electrical and Computer Engineering August 2014 – May 2017
Georgia Institute of Technology – GPA: 4.0 / 4.0
Thesis: "An Assessment of Complementary Silicon-Germanium BiCMOS Technologies for Extreme Environment Applications"
Advisor: Dr. John D. Cressler

B.S. 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

Work Experience

Research Engineer (Jerome and Isabella Karle Fellow) October 2020 – Present
U.S. Naval Research Laboratory *Washington, DC*

- Performed two-photon and single-photon absorption experiments using a pulsed-laser system to quantitatively emulate the effects of heavy ions on electronic devices and circuits
- Served as a radiation effects, device physics, and TCAD subject-matter expert for various research programs and organizations
- Mentored and advised students at different universities on topics related to experiment design and execution, TCAD simulations, radiation effects, and semiconductor device physics

Graduate Research Assistant – SiGe Devices and Circuits Team August 2014 – October 2020
Georgia Institute of Technology *Atlanta, GA*

- Studied 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
- Characterized devices and circuits over temperature, 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
- Oversaw the planning and execution of off-site experiments using different radiation sources to characterize total-ionizing dose, single-event effects, and displacement damage in micro- and nano-electronic devices
- Accumulated over 1,000 hours of radiation effects testing across several facilities

Naval Research Enterprise Internship Program (NREIP) Summer 2018
U.S. 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) Summer 2017
U.S. 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

Undergraduate Research Assistant (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)

Undergraduate Research Assistant 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

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

Teaching And Mentoring Experience

Certification

Tech To Teaching Certificate Spring 2020
Georgia Tech Center for Teaching and Learning *Atlanta, GA*

- Designed to prepare Georgia Tech graduate students and postdocs for college teaching positions.
- Requires both coursework and practicum to ensure a thorough understanding of the scholarship of teaching and learning, and demonstrated ability to apply these skills in the classroom.

Courses Taught

Instructor of Record - GT Freshman Seminar (GT1000) Fall 2019
Georgia Institute of Technology *Atlanta, GA*

- Discussion of topics related to academic, social and professional success including learning styles, time management, major and career exploration, leadership and teamwork.

Instructor of Record - GTA Preparation Course (CETL8000) Fall 2019
Georgia Institute of Technology *Atlanta, GA*

- This course is an introduction to the procedural information and practical skills needed to be an effective graduate teaching assistant. Students are introduced to different instructional techniques and strategies they can implement in their teaching assignments.

Guest Lecturer - Intro to the Microelectronics and Nanotechnology Revolution (CoE3002) Fall 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 - Instrumentation and Electronics Lab (ECE3741) Fall 2014/Spring 2015
Georgia Institute of Technology *Atlanta, GA*

- Basic analog and digital electronic circuits and principles. Techniques of electrical and electronic measurements with laboratory instruments. Intended for non-ECE engineering students.
- Designed and graded quizzes, tests and laboratory experiments to verify students' understanding of the material

CIOS Evaluations (Georgia Tech)

Sem. Taught	Course No. and Name	Level	Enrolled	Responded	Avg. Score for "Instructor Overall Effectiveness" (Max = 5)
Fall 2019	CETL 8000 - GTA Preparation	Grad	40	28	4.9
Fall 2019	GT1000 - GT Freshman Semniar	Undergrad	20	10	4.8

Grants and Contracts

As Principal and Co-Principal Investigator at U.S. Naval Research Laboratory ($>$ $ 3M)

1. A. Ildefonso, "Simulating Interaction of Charged Particle Radiation with Semiconductor Devices Using Non-Linear Optical Processes," Jerome and Isabella Karle Distinguished Scholar Fellowship, $411,934.00, 10/2020-10/2022.

2. A. Ildefonso, "Data-Driven Discovery of Rules to Predict Single-Event Latchup Thresholds in CMOS Integrated Circuits Without Heavy Ion Testing," DARPA Seedling, $785k, 08/2022-09/2023.

3. A. Ildefonso, "Optical Emulation of Cosmic Radiation in Semiconductor Structures," NRL Base Program, $1.876M, 10/2023-09/2025.

4. A. Ildefonso, "Enabling Accurate and Efficient Pulsed-Laser Single-Event Effects Testing," MDA + DTRA, $400k, 08/2023 - 07/2024.

Honors and Awards

Best Paper Awards

- **Meritorious Conference Paper Award** - 2021 IEEE Nuclear and Space Radiation Effects Conference for **A. Ildefonso**, J. P. Kimball, A. Khachatrian, Y. Mensah, J. W. Teng, G. N. Tzintzarov, S. G. Rao, A. Moradinia, J. D. Cressler, D. McMorrow, "Using Machine Learning to Mitigate Single-Event Upsets in RF Circuits and Systems," *IEEE Trans. Nucl. Sci.*, vol. 69, no. 3, pp. 381–389, Mar. 2022.
- **Outstanding Student Paper Award** - 2021 IEEE Nuclear and Space Radiation Effects Conference for J. W. Teng, D. Nergui, H. Parameswaran, G. N. Tzintzarov, H. Ying, C. D. Cheon, S. G. Rao, **A. Ildefonso**, N. A. Dodds, R. N. Nowlin, M. Gorchichko, E. X. Zhang, D. M. Fleetwood, J. D. Cressler, "Response of Integrated Silicon RF *pin* Diodes to X-ray and Fast Neutron Irradiation," *IEEE Trans. Nucl. Sci.*, vol. 69, no. 3, pp. 282–289, Mar. 2022.
- **Outstanding Conference Paper Award and Outstanding Student Paper Award** - 2020 IEEE Nuclear and Space Radiation Effects Conference for G. N. Tzintzarov, **A. Ildefonso**, J. W. Teng, M. Frounchi, A. Djikeng, P. Iyengar, P. S. Goley, R. Bahr, A. Khachatrian, S. P. Buchner, D. McMorrow, J. D. Cressler, "Optical Single-Event Transients Induced in Silicon-Photonic Waveguides by Two-Photon Absorption," *IEEE Trans. Nucl. Sci.*, vol. 68, no. 5, pp. 785–792, May 2021.

- **Outstanding Conference Paper Award** - 2019 IEEE Nuclear and Space Radiation Effects Conference for J. M. Hales, A. Khachatrian, S. Buchner, J. H. Warner, **A. Ildefonso**, G. N. Tzintzarov, D. Nergui, D. M. Monahan, S. D. LaLumondiere, B. Lotshaw, J. D. Cressler, D. McMorrow, "New Approach for Pulsed-Laser Testing That Mimics Heavy-Ion Charge Deposition Profiles," *IEEE Trans. Nucl. Sci.*, vol. 67, no. 1, pp. 81–90, Jan. 2020.
- **Best Student Paper Award** - 2019 IEEE BiCMOS and Compound Semiconductor Integrated Circuits and Technology Symposium (BCICTS) for H. Ying, J. W. Teng, G. N. Tzintzarov, A. P. Omprakash, S. G. Rao, U. Raghunathan, **A. Ildefonso**, S. Fernandez, J. D. Cressler, "DC and RF Variability of SiGe HBTs Operating Down to Deep Cryogenic Temperatures", Proceedings of the 2019 IEEE BiCMOS, Compound Semiconductor Integrated Circuits, and Technology Symposium (BCICTS), 2019, pp. 1–4.
- **Outstanding Conference Paper Award and Outstanding Student Paper Award** - 2018 IEEE Nuclear and Space Radiation Effects Conference for **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, 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.

Fellowships, Scholarships and Travel Grants

- Jerome and Isabella Karle Fellowship at U.S. Naval Research Laboratory 2020-2022.
- Georgia Tech Leadership Fellow 2018
- NSF-Funded ASSIST Travel Grant to participate in the LEVERAGE program at the 2018 SACNAS Conference
- IEEE NPSS Paul Phelps Continuing Education Grant 2018
- IEEE NPSS Graduate Scholarship 2018
- NextProf Participant at University of Michigan 2017
- Science Alliance Leadership Training (SALT) Fellow of the New York Academy of Sciences 2017
- National Science Foundation Graduate Research Fellow 2015
- Goizueta Foundation Fellow 2015, 2017
- Georgia Tech Presidential Fellowship (2014 – 2018)
- GEM Fellow 2014
- Georgia Institute of Technology FOCUS Scholar (2012, 2014)
- Verizon Foundation Scholar (2010 – 2014)

Professional Service

Professional Society Activities

- **Social Media Coordinator**, Radiation Effects Steering Group, IEEE Nuclear and Plasma Sciences Society, 2020 – 2023
- **Social Media Coordinator**, 2020 IEEE Nuclear and Space Radiation Effects Conference. Held virtually on November 29 - December 30, 2020.
- **Workshop Chair**, 2021 ESTD Workshop on Theory, Simulation, and Modeling. Held Virtually at the U.S. Naval Research Laboratory on March 30th, 2021.
- **Social Media Coordinator**, 2021 IEEE Nuclear and Space Radiation Effects Conference, held virtually.
- **Technical Session Co-Chair**, Single-Event Effects: Mechanisms and Modeling, 2021 Radiation and its Effects on Components and Systems (RADECS) Conference, held in Vienna, Austria.
- **Social Media Coordinator**, 2022 IEEE Nuclear and Space Radiation Effects Conference, held in Provo, Utah on July 18-22, 2022.
- **Technical Session Chair**, Session D - Electronics & Photonic Device Data, Techniques, and Diagnostics, 2022 Single-Event Effects (SEE) Symposium, held at La Jolla, California on May 15-19, 2022
- **Awards Committee Member**, 2022 IEEE Nuclear and Space Radiation Effects Conference, held in Provo, Utah on July 18-22, 2022.
- **Technical Program Chair**, 2023 Single-Event Effects (SEE) Symposium, held in La Jolla, California on May 15-19, 2023.
- **Technical Session Co-Chair**, Single-Event Effects: Mechanisms and Modeling, 2023 Radiation and its Effects on Components and Systems (RADECS) Conference, to be held in Toulouse, France on September 25-29, 2023.
- **General Chair**, 2024 Single-Event Effects (SEE) Symposium, to be held in La Jolla, California on May 2024.
- **Technical Session Chair**, Radiation Effects in Devices and Integrated Circuits, 2024 IEEE Nuclear and Space Radiation Effects Conference (NSREC), to be held in Ottawa, Canada on July 22-26, 2024.
- **Poster Session Co-Chair**, 2024 Radiation and its Effects on Components and Systems (RADECS) Conference, to be held in Maspalomas, Canary Islands, Spain on September 16-20, 2023.

Journal Reviewer
- IEEE Access
- IEEE Electron Device Letters
- IEEE Sensors Journal
- IEEE Transactions on Nuclear Science
- Microelectronics Reliability
- Nuclear Instruments and Methods in Physics Research

Conference Reviewer
- Nuclear and Space Radiation Effects Conference (NSREC) (2019, 2020, 2022)
- Radiation Effects on Components and Systems (RADECS) Conference (2017, 2020, 2021, 2022, 2023)
- SACNAS Conference (2018, 2019, 2020)

Scholarship Reviewer
- SACNAS Conference Travel Scholarship for Undergraduates (2018, 2019, 2020)
- Goizueta Fellowship at the Georgia Institute of Technology (2018, 2019)
- Presidential Undergraduate Research Awards at the Georgia Institute of Technology (2018, 2019)

Research Proposal Reviewer
- National Science Foundation (2021)
- NASA (2021)

Professional Memberships
- Institute of Electrical and Electronic Engineers (IEEE) - Student Member (2010 - 2019), Member (2019 - Present)
- IEEE Nuclear and Plasma Sciences Society (2015 - Present)
- IEEE Electron Devices Society (2013 - 2015)
- IEEE Computer Society (2012 - 2014)
- Tau Beta Pi – PR Alpha Chapter

Publications

Publication Summary
40	Refereed Journal Publications
6	Refereed Journal Papers in Press or Under Review
8	Refereed Conference Proceedings
4	Refereed Conference Proceedings in Press or Under Review
38	Refereed Conference Papers With A Short Abstract (No Formal Proceedings)
3	Technical Reports and Guidelines
12	h-index on Google Scholar (>450 citations)

Refereed Journal Publications
1. A. Cardoso, A. Omprakash, P. Chakraborty, N. Karaulac, D. Fleischhauer, **A. Ildefonso**, S. Zeinolabedinzadeh, M. Oakley, T. Bantu, N. Lourenco, 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. Khachatrian, S. Buchner, D. McMorrow, J. Warner, P. Paki, 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. N. E. Lourenco, S. Zeinolabedinzadeh, **A. Ildefonso**, Z. E. Fleetwood, C. T. Coen, I. Song, S. Jung, F. Inanlou, N. J.-H. Roche, A. Khachatrian, D. McMorrow, S. P. Buchner, J. H. Warner, P. Paki, 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.
4. C. T. Coen, A. C. Ulusoy, P. Song, **A. Ildefonso**, M. Kaynak, B. Tillack, 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.

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. Khachatrian, S. P. Buchner, D. McMorrow, P. Paki, 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. **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, 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, Nominated for the Outstanding Student Paper Award at the 2016 Nuclear and Space Radiation Effects Conference.
7. N. E. Lourenco, Z. E. Fleetwood, **A. Ildefonso**, M. T. Wachter, N. J.-H. Roche, A. Khachatrian, D. McMorrow, S. P. Buchner, J. H. Warner, H. Itsuji, D. Kobayashi, K. Hirose, P. Paki, A. Raman, 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, Nominated for the Outstanding Student Paper Award at the 2016 Nuclear and Space Radiation Effects Conference.
8. A. Omprakash, Z. Fleetwood, U. Raghunathan, **A. Ildefonso**, A. Cardoso, N. Lourenco, J. Babcock, R. Mukhopadhyay, E. X. Zhang, D. Fleetwood, 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.
9. I. Song, M. K. Cho, M. A. Oakley, **A. Ildefonso**, I. Ju, S. P. Buchner, D. McMorrow, P. Paki, 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.
10. **A. Ildefonso**, I. Song, G. N. Tzintzarov, Z. E. Fleetwood, N. E. Lourenco, M. T. Wachter, 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, 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. **A. Ildefonso**, C. T. Coen, Z. E. Fleetwood, G. N. Tzintzarov, M. T. Wachter, A. Khachatrian, D. Mcmorrow, J. H. Warner, P. Paki, 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.
13. N. E. Lourenco, **A. Ildefonso**, G. N. Tzintzarov, Z. E. Fleetwood, K. Motoki, P. Paki, M. Kaynak, 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. J. M. Hales, A. Khachatrian, S. Buchner, N. J.-H. Roche, J. Warner, Z. E. Fleetwood, **A. Ildefonso**, J. D. Cressler, V. Ferlet-Cavrois, 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.
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, 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. 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, 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, Received Outstanding Student Paper Award and Outstanding Conference Paper Award at the 2018 Nuclear and Space Radiation Effects Conference.
17. 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, 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.
18. J. M. Hales, A. Khachatrian, J. Warner, S. Buchner, **A. Ildefonso**, G. N. Tzintzarov, D. Nergui, D. M. Monahan, S. D. LaLumondiere, J. D. Cressler, D. McMorrow, "Using Bessel beams and two-photon absorption to predict radiation effects in microelectronics," *Opt. Express*, vol. 27, no. 26, pp. 37 652–37 666, Dec. 2019.
19. J. M. Hales, A. Khachatrian, S. Buchner, J. H. Warner, **A. Ildefonso**, G. N. Tzintzarov, D. Nergui, D. M. Monahan, S. D. LaLumondiere, B. Lotshaw, J. D. Cressler, D. McMorrow, "New Approach for Pulsed-Laser Testing That Mimics

Heavy-Ion Charge Deposition Profiles," *IEEE Trans. Nucl. Sci.*, vol. 67, no. 1, pp. 81–90, Jan. 2020, Received Outstanding Conference Paper Award at the 2019 Nuclear and Space Radiation Effects Conference.

20. **A. Ildefonso**, G. N. Tzintzarov, A. P. Omprakash, D. Nergui, P. S. Goley, J. M. Hales, A. Khachatrian, S. P. Buchner, J. H. Warner, D. McMorrow, J. D. Cressler, "Comparison of Single-Event Transients in SiGe HBTs on Bulk and Thick-Film SOI," *IEEE Trans. Nucl. Sci.*, vol. 67, no. 1, pp. 71–80, Jan. 2020, Nominated for the Outstanding Conference Paper Award at the 2019 Nuclear and Space Radiation Effects Conference.
21. D. Nergui, **A. Ildefonso**, G. N. Tzintzarov, N. E. Lourenco, A. P. Omprakash, P. S. Goley, Z. E. Fleetwood, S. D. Lalumondiere, J. P. Bonsall, D. M. Monahan, H. Kettering, D. L. Brewe, J. D. Cressler, "Single-Event Transients in SiGe HBTs Induced by Pulsed X-Ray Microbeam," *IEEE Trans. Nucl. Sci.*, vol. 67, no. 1, pp. 91–98, Jan. 2020.
22. G. N. Tzintzarov, **A. Ildefonso**, P. S. Goley, M. Frounchi, D. Nergui, S. G. Rao, J. Teng, J. Campbell, A. Khachatrian, S. P. Buchner, D. McMorrow, J. H. Warner, M. Kaynak, L. Zimmermann, J. D. Cressler, "Electronic-to-Photonic Single-Event Transient Propagation Analysis in a Segmented Mach-Zehnder Modulator in a Si/SiGe Integrated Photonics Platform," *IEEE Trans. Nucl. Sci.*, vol. 67, no. 1, pp. 260–267, Jan. 2020.
23. A. R. Sarker, S. Jung, **A. Ildefonso**, A. Khachatrian, S. P. Buchner, D. McMorrow, P. Paki, J. D. Cressler, I. Song, "Mitigation of Single-Event Effects in SiGe-HBT Current-Mode Logic Circuits," *Sensors*, vol. 20, no. 9, p. 2581, May 2020.
24. **A. Ildefonso**, N. E. Lourenco, G. N. Tzintzarov, Z. E. Fleetwood, A. Khachatrian, S. P. Buchner, D. McMorrow, J. H. Warner, M. Kaynak, J. D. Cressler, "Tradeoffs Between RF Performance and SET Robustness in Low-Noise Amplifiers in a Complementary SiGe BiCMOS Platform," *IEEE Trans. Nucl. Sci.*, vol. 67, no. 7, pp. 1521–1529, Jul. 2020.
25. M. Frounchi, G. N. Tzintzarov, **A. Ildefonso**, J. Cressler, "High Responsivity Ge Phototransistors in a Commercial 90-nm CMOS Si-Photonics Platform for Monolithic Optoelectronic Receivers," *IEEE Electron Device Lett.*, vol. 42, no. 2, pp. 196–199, Feb. 2021.
26. S. J. Pearton, A. Aitkaliyeva, M. Xian, F. Ren, A. Khachatrian, **A. Ildefonso**, Z. Islam, M. A. J. Rasel, A. Haque, A. Y. Polyakov, J. Kim, "Review—Radiation Damage in Wide and Ultra-Wide Bandgap Semiconductors," *ECS Journal of Solid State Science and Technology*, vol. 10, no. 5, p. 055 008, May 2021.
27. J. M. Hales, A. Khachatrian, S. Buchner, **A. Ildefonso**, D. M. Monahan, S. D. LaLumondiere, D. McMorrow, "Mapping the Spatial Dependence of Charge Collection Efficiency in Devices Using Pulsed-Laser Testing," *IEEE Trans. Nucl. Sci.*, vol. 68, no. 5, pp. 617–625, May 2021.
28. J. W. Teng, **A. Ildefonso**, G. N. Tzintzarov, A. Moradinia, P. F. Wang, X. Li, E. X. Zhang, D. M. Fleetwood, J. D. Cressler, "Variability in Total-Ionizing-Dose Response in 4th-Generation SiGe HBTs," *IEEE Trans. Nucl. Sci.*, vol. 68, no. 5, pp. 949–957, May 2021.
29. G. N. Tzintzarov, **A. Ildefonso**, J. W. Teng, M. Frounchi, A. Djikeng, P. Iyengar, P. S. Goley, R. Bahr, A. Khachatrian, S. P. Buchner, D. McMorrow, J. D. Cressler, "Optical Single-Event Transients Induced in Silicon-Photonic Waveguides by Two-Photon Absorption," *IEEE Trans. Nucl. Sci.*, vol. 68, no. 5, pp. 785–792, May 2021, Received Outstanding Student Paper Award and Outstanding Conference Paper Award at the 2020 Nuclear and Space Radiation Effects Conference.
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2. J. M. Hales, **A. Ildefonso**, A. Khachatrian, G. Allen, D. McMorrow, "Quantitative Laser Testing for Predicting Heavy-Ion SEE Response – Part 2: Accurately Determining Laser-Equivalent LET," *IEEE Trans. Nucl. Sci.*, Submitted, Under Review.
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2. E. Pesola, K. Kolcio, M. Prather, **A. Ildefonso,** "A Hybrid Model-Based and Data-Driven Framework for Automated Spacecraft Fault Detection", Proc. of the Annual Conf. of the PHM Society, Accepted for Oral Presentation.
3. J. W. Teng, D. Nergui, Y. A. Mensah, **A. Ildefonso**, J. D. Cressler, "Design Choices for SET Mitigation in SiGe Cascode Low-Noise Amplifiers", 2023 Radiation, its Effects on Components, and Systems (RADECS) Conference, Accepted for Oral Presentation.
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Technical Reports and Guidelines

1. K. L. Ryder, A. M. Phan, M. J. Campola, A. Khachatrian, D. P. McMorrow, **A. Ildefonso,** "Analog Devices AD620 Instrumentation Amplifier Laser Single-Event Effects Characterization Test Report," National Aeronautics and Space Administration (NASA), Technical Memorandum NASA/TM-20210026447, Jan. 2022.
2. K. L. Ryder, A. M. Phan, M. J. Campola, A. Khachatrian, D. P. McMorrow, **A. Ildefonso,** "Texas Instruments LM7171 Voltage Feedback Amplifier Laser Single-Event Effects Characterization Test Report," National Aeronautics and Space Administration (NASA), Technical Memorandum NASA/TM-20210026449, Jan. 2022.
3. D. McMorrow, S. Buchner, J. M. Hales, **A. Ildefonso**, A. Khachatrian, G. Allen, M. Campola, K. L. Ryder, "Pulsed-Laser Single-Event Effects (PL SEE) Testing - A Practical Desk Reference," Defense Threat Reduction Agency (DTRA), Technical Report DTRA-TR-23-43, May 2023.

Presentations and Workshops

Presentation Summary

16 Oral and Poster Presentations
3 Invited Lectures and Seminars
3 Leadership and Professional Development Workshops

Oral and Poster Presentations

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, 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*, Jul. 2016.
2. **A. Ildefonso**, I. Song, Z. Fleetwood, N. E. Lourenco, M. T. Wachter, 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 (RADECS) Conference*, Sep. 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, 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*, Jul. 2017.
4. **A. Ildefonso**, 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*, Oct. 2017.
5. **A. Ildefonso**, J. D. Cressler, "Radiation Hardening Strategies for SiGe-Based RF Communications Circuits and Systems", oral presentation at 2018 *GOMACTech Conference*, Mar. 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, 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*, Jul. 2018.
7. **A. Ildefonso**, G. N. Tzintzarov, D. Nergui, A. P. Omprakash, H. Ying, J. D. Cressler, "Silicon-Germanium Platforms: An Enabling Technology for Next-Generation Space Systems", poster presentation at the 2018 *Space Innovations Symposium*, Nov. 2018.
8. **A. Ildefonso**, J. D. Cressler, "Silicon-Germanium Platforms: An Enabling Technology for Next-Generation Space Systems", oral presentation at the 2019 *Exploration and Origins Colloquium*, Mar. 2019.
9. **A. Ildefonso**, G. N. Tzintzarov, A. P. Omprakash, D. Nergui, P. S. Goley, J. M. Hales, A. Khachatrian, S. P. Buchner, J. H. Warner, D. McMorrow, J. D. Cressler, "Comparison of Single-Event Transients in SiGe HBTs on Bulk and Thick-Film SOI", oral presentation at the 2019 *IEEE Nuclear and Space Radiation Effects Conference*, Jul. 2019.
10. **A. Ildefonso**, G. N. Tzintzarov, N. E. Lourenco, Z. E. Fleetwood, A. Khachatrian, S. P. Buchner, D. McMorrow, J. H. Warner, M. Kaynak, J. D. Cressler, "Tradeoffs Between RF Performance and SET Robustness in Low-Noise Amplifiers in a Complementary SiGe BiCMOS Platform", oral presentation at the 2019 *Radiation Effects on Components and Systems (RADECS) Conference*, Sep. 2019.
11. **A. Ildefonso**, G. N. Tzintzarov, D. Nergui, J. M. Hales, A. Khachatrian, A. Omprakash, S. P. Buchner, D. McMorrow, J. D. Cressler, "Laser-Induced Transients in SiGe HBTs Generated via Two-Photon Absorption Using Gaussian and Quasi-Bessel Beams", Paper B-5, oral presentation at the *2020 IEEE Nuclear and Space Radiation Effects Conference*, Dec. 2020.

12. **A. Ildefonso**, J. P. Kimball, J. D. Cressler, D. McMorrow, "Using Machine Learning to Mitigate Single-Event Upsets in RF Circuits and Systems", Paper D-3, oral presentation at the *2021 IEEE Nuclear and Space Radiation Effects Conference*, Jul. 2021.
13. **A. Ildefonso**, J. M. Hales, A. Khachatrian, S. P. Buchner, D. McMorrow, "Not All Pulsed-Laser SEEs Are Created Equal: The Importance of Accurate Characterization and Reporting of Pulsed-Laser Parameters", Paper B-4, oral presentation at the *2022 Single Event Effects Symposium*, May 2022.
14. **A. Ildefonso**, J. M. Hales, A. Khachatrian, P. D. Cunningham, D. Nergui, G. N. Tzintzarov, A. P. Omprakash, J. D. Cressler, D. McMorrow, "Leveraging the Wavelength Dependence of Optical Charge Generation to Correlate Ion- and Laser-Induced Transients in Modern SiGe HBTs", Paper A-2, oral presentation at the *2022 IEEE Nuclear and Space Radiation Effects Conference*, Jul. 2022.
15. **A. Ildefonso**, A. Khachatrian, J. M. Hales, S. P. Buchner, D. McMorrow, "Pulsed-Laser Testing as an Educational Tool for SEE Mechanisms and Testing", Paper D-2, La Jolla, CA, USA: oral presentation at the *2023 Single Event Effects Symposium*, May 2023.
16. **A. Ildefonso**, J. M. Hales, A. Khachatrian, G. Allen, D. McMorrow, "Quantitative Laser Testing for Predicting Heavy-Ion SEE Response – Part 1: Metrics for Assessing Response Agreement", Paper E-1, oral presentation at the *2022 IEEE Nuclear and Space Radiation Effects Conference*, Jul. 2023.

Invited Lectures and Seminars

1. **A. Ildefonso**, *Single-Event Effects in RF Circuits: How Tiny Lightning Strikes Can Wreak Havoc in Space Communications Systems*, Emerging Scholars in Engineering Lecture Series, Vanderbilt University, Nashville, TN, Dec. 2019.
2. **A. Ildefonso**, *Single-Event Effects Research at the U.S. Naval Research Laboratory*, SCALE Workforce Development Program, Virtual, Jun. 2021.
3. **A. Ildefonso**, A. Khachatrian, J. M. Hales, S. Buchner, D. McMorrow, *Simulating the Natural Space Radiation Environment on Earth - Pulsed Lasers*, Single-Event Effects University Symposium, Virtual, Oct. 2022.

Leadership and Professional Development Workshops

1. **A. Ildefonso**, *How to Read a Scientific Paper: Effective Strategies to Catch Up with the Literature in your Field*, Effective Graduate Student Series, Georgia Institute of Technology, Atlanta, GA, Sep. 2019, Workshop aimed for first-year graduate students to help them navigate scientific papers.
2. **A. Ildefonso**, *The LEGO Brick – More than a Toy*, Invited Workshop at GT1000 Class, Georgia Institute of Technology, Atlanta, GA, Nov. 2019, Workshop on effective teamwork that features hands-on activity using LEGO bricks.
3. **A. Ildefonso**, *Discovering Personal Values*, Office of Leadership Education and Development, Georgia Institute of Technology, Atlanta, GA, Feb. 2020, Workshop with hands-on exercise on discovering personal values and intentionally using them to guide our actions.

Administrative Experience

Laboratory 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

Other Activities and Volunteer Work

- **ECE Graduate Student Organization at Georgia Tech** (Member 2015 – 2020, Vice President 2017 – 2018, President 2018 – 2019)
- **Focus Program (2015, 2016, 2017, 2020)** (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
- **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