

Dimitrios Sounas

Curriculum Vitae

September 2018

Address: Department of Electrical & Computer Engineering
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General Information

Sept. 4, 1981 Date of birth, Thessaloniki, Greece
Nov. 2009 – July 2010 Military service in the Hellenic Armed Forces

Research Interests

My research interests lie in the **broad area of electromagnetics, covering a wide range of the spectrum from microwaves to THz and optics**. My goal is to explore new concepts that support interesting and unusual phenomena and have a potential of overcoming the limitations of contemporary electromagnetic systems. I am also very interested in other physical domains, such as **acoustics and quantum systems**, which have strong similarities with electromagnetics and are very important for applications in communications, biomedical applications, computing, and several others. A few topics that I have recently worked on include:

- Magnet-less non-reciprocity for full-duplex systems (first circulator ever developed based on time modulation)
- Non-linear and non-reciprocal devices for switching, tunability and radiation hardening
- Gradient metasurfaces for extreme wave-front manipulation
- Graphene electromagnetics for microwave and THz applications
- Active and parity-time symmetric devices for scattering cancelation and planar focusing
- Topological metamaterials
- Acoustical and mechanical isolators and circulators
- Analytical modeling of classical wave phenomena

Professional Experience

Aug. 2018 – present Assistant Professor
Department of Electrical and Computer Engineering
Wayne State University

Sept. 2015 – Aug. 2018 Research Scientist
The University of Texas at Austin, USA
Metamaterials and Plasmonics Research Group
Group leader: Prof. Andrea Alù

Nov. 2012 – Aug. 2015 Postdoctoral Fellow
The University of Texas at Austin, USA
Metamaterials and Plasmonics Research Group
Group leader: Prof. Andrea Alù

Feb. 2015 – July 2015 Research Visitor
FOM Institute AMOLF, The Netherlands
Resonant Nanophotonics Group
Group leader: Prof. Femius Koenderink

Sept. 2010 – Oct. 2012 Postdoctoral Fellow

- École Polytechnique de Montréal, Canada
Electromagnetic Theory and Applications Research Group
Group leader: Prof. Christophe Caloz
- 2004 – 2009 Graduate Research Assistant
Aristotle University of Thessaloniki, Greece
Applied and Computational Electromagnetics Laboratory
Group leader: Prof. Theodoros Tsiboukis

Education

- 2004 – 2009 Ph.D. in Electrical and Computer Engineering
Aristotle University of Thessaloniki, Greece
Ph.D Thesis: Analytical study of planar and wedge-shaped double-negative meta-material structures
Ph.D. Advisor: Prof. Theodoros Tsiboukis
- 1999 – 2004 Diploma/M.Eng. in Electrical and Computer Engineering
Aristotle University of Thessaloniki, Greece
GPA: 9.48/10.00

Distinctions

- 2017 Senior Member of IEEE
- 2005 3 years Postgraduate Studies Scholarship (declined)
Greek State Scholarships Foundation
- 2004 Graduation Award of Excellence
Technical Chamber of Greece
- 2000 – 2004 Annual Scholarships of Excellence
Greek State Scholarships Foundation
- 2000 – 2004 Annual Awards of Excellence
Technical Chamber of Greece

Experience with Research Proposals

- 2018 – 2023 **U.S. Air Force Office of Scientific Research (AFOSR)**
“MURI: Magnet- Free Non-Reciprocal Metamaterials Based on Spatio-Temporal Modulation”
Collaboration between the City University of New York, Stanford University, University of Michigan and Columbia University
Project Manager: A. Nachman
Role: Key personnel. I have developed several of the proposed ideas and participated in the preparation of the proposal.
- 2016 **Defence Advanced Research Projects Agency (DARPA)**
“Phase I SBIR: Plasmonic Fano-Metasurfaces for Optical Signal Processing”
Collaboration between Nanohmics (Austin, TX) and the City University of New York
Project Manager: M. Fiddy
Role: Key personnel. I have developed several of the proposed ideas and participated in the preparation of the proposal.
- 2016 – 2020 **National Science Foundation (NSF)**
Amount: \$2M for 4 years
“ EFRI NewLAW: New frontiers for topologically-protected propagation of light, sound, elastic and mechanical waves”

Collaboration between the UT Austin, Stanford University, Columbia University and the City University of New York

Project Manager: K. Peters

Role: Key personnel. I have developed several of the proposed ideas and participated in the preparation of the proposal.

2016 – 2019 **Defence Advanced Research Projects Agency (DARPA)**

Amount: \$1M for 3 years (UT Austin share), \$2.7M total amount

“Microelectromechanical Resonant Circulator (MIRC)”

Collaboration between Northeastern University and UT Austin

Project Manager: T. Olsson

Role: Key personnel. I have developed several of the proposed ideas and participated in the preparation of the proposal.

2016 – 2019 **Defence Advanced Research Projects Agency (DARPA)**

Amount: \$702k for 3 years (UT Austin share), \$1.8M total amount

“High-performance Parametric RF Integrated Non-reciprocal Circulators (HIPERION)”

Collaboration between Columbia University and UT Austin

Project Manager: T. Olsson

Role: Key personnel. I have developed several of the proposed ideas and participated in the preparation of the proposal.

2014 – 2017 **National Science Foundation (NSF)**

Amount: \$360k for 3 years

“Magnetic-free, integrated nanophotonic components based on angular-momentum bias”

Project Manager: D. Dagenais

Role: Key personnel. I have developed the proposed ideas and prepared the technical part of the proposal.

2014 – 2017 **U.S. Air Force Office of Scientific Research (AFOSR)**

Amount: \$420k for 3 years

“Giant non-reciprocity without magnetic effects”

Project Manager: A. Sayir

Role: Key personnel. I have developed several of the proposed ideas and participated in the preparation of the proposal.

2005 – 2008 **Greek General Secretariat of Research and Technology (GSRT)**

Research Personnel Support Programme (PENED Scholarship)

“Design & Implementation of Innovative Microwave and Optical Communication Circuits”

Participation in Review Meetings and Workshops

- 10-11 Jan. 2018 DARPA/MTO SPAR Annual Review Meeting
Salt Lake City, UT
Project Manager: T. Olsson
- 25-27 Nov. 2017 NSF Acoustics Workshop
Alexandria, VA
Project Manager: M. Ruzzene
- 9-10 Nov. 2016 DARPA/MTO SPAR Kickoff Meeting
New Orleans, LA
Project Manager: T. Olsson
- 22 Jul. 2016 2016 DTRA Basic Research Technical Review
Springfield, VA
Project Manager: J. Calkins

Teaching - Mentoring Experience

PhD Students

- A. Kord Department of Electrical and Computer Engineering
The University of Texas at Austin
Advisor: Prof. Andrea Alù
2015 – present
Project: Magnetless parametric circulators
- **2018 IEEE MTT-S Graduate Fellowship**
 - **Student design contest winner on magnetless parametric circulators in 2017 IMS, Honolulu, HI.**
 - **Best student paper award at the 2017 Texas Symposium on Wireless & Microwave Circuits & Systems** for the paper “Active electromagnetic devices for next generation wireless communication systems.”
 - **2016 IEEE Antennas and Propagation Doctoral Research Award** for the project “New Frontiers in Electromagnetic Metamaterials Using Active Circuits”
 - **2016 Qualcomm Innovation Fellowship** for the project “Fully-Integrated Reconfigurable Magnet-less Non-reciprocal Components for Next-Generation Wireless Communication Systems”, in collaboration with Columbia University.
- M. Tymchenko Department of Electrical and Computer Engineering
The University of Texas at Austin
Advisor: Prof. Andrea Alù
2016 – present
Project: Time-modulated delay lines
- Z. Xiao Department of Electrical and Computer Engineering
The University of Texas at Austin
Advisor: Prof. Andrea Alù
2016 – present
Project: MEMS parametric circulators
- C. Wiederhold Department of Electrical and Computer Engineering
The University of Texas at Austin
Advisor: Prof. Andrea Alù
2017 – present
Project: Acoustic nonreciprocal devices
- H. Kwon Department of Electrical and Computer Engineering

- The University of Texas at Austin
 Advisor: Prof. Andrea Alù
 2017 – present
 Project: Nonlocal metasurfaces
 • **Finalist in 2018 IEEE APS/URSI student paper competition** with the paper “Nonlocal Metasurfaces Performing Analog Mathematical Operations”
- R. Duggan Department of Electrical and Computer Engineering
 The University of Texas at Austin
 Advisor: Prof. Andrea Alù
 2017 – present
 Project: Superluminal transmission lines, inverse Faraday effect
- L. Quan Department of Electrical and Computer Engineering
 The University of Texas at Austin
 Advisor: Prof. Andrea Alù
 2015 – 2016
 Project: Density-near-zero acoustical waveguides, bianisotropic metamaterials
- N. A. Estep Department of Electrical and Computer Engineering
 The University of Texas at Austin
 Advisor: Prof. Andrea Alù
 2013 – 2015
 Project: Magnetless parametric nonreciprocity
 • **Third place at the student paper competition in the 2015 International Microwave Symposium, Phoenix, AZ** for the paper “On-chip non-reciprocal components based on angular-momentum biasing.”
 • **Best student paper award at the 2014 Texas Symposium on Wireless & Microwave Circuits & Systems** for the paper “Angular-Momentum-Biasing for Non-Reciprocal Radio-Frequency Components.”
 • **Honorable mention award at the 2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting** for the paper “Fully Integrated, Compact Microwave Circulator Using Angular-Momentum Biasing.”
- R. Fleury Department of Electrical and Computer Engineering
 The University of Texas at Austin
 Advisor: Prof. Andrea Alù
 2013 – 2015
 Project: Acoustic nonreciprocity
 • **Best Student Paper Award at the 168th Meeting of the Acoustical Society of America in Indianapolis, IN**, for the paper “Non-reciprocal acoustic devices based on spatio-temporal angular-momentum modulation.”
 • **Young Presenter Award in Noise at the 168th Meeting of the Acoustical Society of America in Indianapolis, IN**, for the paper “Parity-time symmetric metamaterials and metasurfaces for loss-immune and broadband acoustic wave manipulation.”
 • **Best student paper award in Metamaterials 2014, Copenhagen, Denmark**, for the paper “Parity-Time Acoustic Metamaterials and Unidirectional Invisible Sensors.”
- N. Chamanara Department of Electrical and Computer Engineering
 École Polytechnique de Montréal
 Advisor: Prof. Christophe Caloz
 2010 – 2012
 Project: Graphene devices

A. Dimitriadis Department of Electrical and Computer Engineering
 Aristotle University of Thessaloniki
 Advisor: Prof. Theodoros Tsiboukis
 2009 – 2010
 Project: Homogenization of metasurfaces

Masters Students

S. Couture Department of Electrical and Computer Engineering
 École Polytechnique de Montréal
 Advisor: Prof. Christophe Caloz
 2011 – 2012
 Project: Graphene leaky-wave antennas

M. Dagher Department of Electrical and Computer Engineering
 École Polytechnique de Montréal
 Advisor: Prof. Christophe Caloz
 2010 – 2012
 Project: Traveling-wave-tube amplifiers

Teaching

Fall 2018 ECE 4800: Electromagnetic Fields and Waves 1
 Department of Electrical and Computer Engineering
 Wayne State University, USA

2013 – 2018 Occasional Lecturer
 EE383N: Theory of Electromagnetic Fields: Electrodynamics
 EE363M: Microwave Engineering
 The University of Texas at Austin, USA
 Department of Electrical and Computer Engineering

2005 – 2008 Graduate Teaching Assistant
 Aristotle University of Thessaloniki, Greece
 Department of Electrical and Computer Engineering
 Electromagnetic Field Theory I, II, III & IV

Invited Talks

Sept. 1, 2018 European School on Metamaterials, Espoo, Finland

Mar. 31, 2017 Electrical Engineering Department, Columbia University

Feb. 16, 2017 Department of Electrical and Computer Engineering, University of California, Davis

Oct. 7, 2016 Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki

Oct. 3, 2016 Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology Hellas (FORTH)

Sept. 1, 2016, Department of Electrical and Computer Engineering, University of Nebraska, Lincoln

July 9, 2015 Department of Physics, King's College London

June 15, 2015 FOM Institute AMOLF, The Netherlands

March 11, 2015 Department of Electrical and Computer Engineering, University of Michigan, Ann Arbor

Service

Reviewer of International Scientific Journals

Science, Nature, Nature Physics, Nature Communications, Scientific Reports, IEEE Transactions on Antennas and Propagation, IEEE Transactions on Microwave Theory and Techniques, IEEE Transactions on Terahertz Science and Technology, Journal of Lightwave Technology, Journal of Selected Topics in Quantum Electronics, IEEE Antennas and Wireless Propagation Letters, IEEE Microwaves and Wireless Components Letters, IEEE Journal on Multiscale and Multiphysics Computational Techniques, Physical Review X, Physical Review Letters, Physical Review Applied, Physical Review A, Physical Review B, Applied Physics Letters, Journal of Applied Physics, Optics Express, Photonics Research Review, Journal of the Optical Society of America B, ACS Photonics, New Journal of Physics, EPJ Applied Metamaterials, Radio Science, IET Microwaves Antennas & Propagation

Reviewer of Research Proposals

2013 – 2018 Center for Integrated Nanotechnologies (CINT)

2015 – 2016 Research Foundation - Flanders (FWO)

Conference Sessions Organizer

2016 **10th European Conference on Antennas and Propagation**, Applications of graphene and low dimensional materials

Conference Sessions Chair

2018 **12th International Congress on on Artificial Materials for Novel Wave Phenomena**, Topological effects 1

2018 USNC-URSI National Radio Science Meeting, Nonmagnetic and nonreciprocal devices

2017 **2017 International Workshop on Antenna Technology**, Plenary Session

2016 **10th European Conference on Antennas and Propagation**, Applications of graphene and low dimensional materials

10th European Conference on Antennas and Propagation, Metamaterials I

2016 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting, Metamaterials: Theoretical Studies and Novel Designs

2016 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting, Nanoelectromagnetics

2016 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting, Nonlinear, Nonuniform and Artificial Circuits and Materials

2016 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting, Power Dividers and Circulators

10th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Cloaking and transformation approaches I

2015 **2015 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting**, Theoretical studies in metamaterial characterization

2014 **2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting**, Metamaterial structures for antenna enhancement

8th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics (Metamaterials' 2014), Thermal metamaterials

Publications

71 peer-reviewed international journals, including **Science**, various **Nature** journals, **ACS Photonics**, **Physical Review Letters**, and **IEEE Transactions**

132 international conferences

2 book chapters

4 patents (2 grant)

Google Scholar Profile

<http://scholar.google.com/citations?user=H1pdU5cAAAAJ&hl=en>

2745 citations (Sep. 2018)

Preprints

1. A. Kord, **D. L. Sounas**, and A. Alù, "Active cloaking using parity-time symmetric satellites," under review.
2. H. Kwon*, **D. L. Sounas***, A. Cordaro, A. Polman, and A. Alù, "Nonlocal metasurfaces for optical signal processing," under review.
3. S. A. Mann, **D. L. Sounas**, and A. Alù, "Nonreciprocal cavities and the time-bandwidth limit," <https://arxiv.org/abs/1804.07420>.

Refereed research papers

1. **D. L. Sounas**, N. A. Estep, A. Kord, and A. Alù, "Angular-momentum biased circulators and their power consumption," *IEEE Antennas Wireless Propag. Lett.*, to be published.
2. A. Kord, **D. L. Sounas**, Z. Xiao, and A. Alù, "Broadband cyclic-symmetric magnet-less circulators and theoretical bounds on their bandwidth," *IEEE Trans. Microw. Theory Techn.*, to be published, <https://arxiv.org/abs/1805.01945>.
3. D. Ramaccia, **D. L. Sounas**, A. Alù, F. Bilotti, and A. Toscano, "Non-reciprocity in antenna radiation induced by space-time varying metamaterial cloaks," *IEEE Antennas Wireless Propag. Lett.*, to be published.
4. **D. L. Sounas** and A. Alù, "Nonreciprocity based on nonlinear resonances," *IEEE Antennas Wireless Propag. Lett.*, to be published.
5. C. Caloz, A. Alù, S. Tret'yakov, **D. L. Sounas**, K. Achouri, and Z. L. Deck-Léger, "What is nonreciprocity?" *Phys. Rev. Appl.*, to be published, <https://arxiv.org/abs/1804.00235>.
6. A. Nagulu, T. Dinc, Z. Xiao, M. Tymchenko, **D. L. Sounas**, A. Alù, and H. Krishnaswamy, "Non-reciprocal components based on switched transmission lines," *IEEE Trans. Microw. Theory Techn.*, early access: <https://ieeexplore.ieee.org/document/8435969/>.
7. L. Quan, Y. Ra'di, **D. L. Sounas**, and A. Alù, "Maximum willis coupling in acoustic scatterers," *Phys. Rev. Lett.*, vol. 120, p. 254301, 2018.
8. A. Mock, **D. L. Sounas**, and A. Alù, "Tunable orbital angular momentum radiation from angular momentum-biased microcavities," *Phys. Rev. Lett.*, vol. 121, p. 103901, 2018.
9. C. Qin, F. Zhou, Y. Peng, **D. L. Sounas**, X. Zhu, B. Wang, J. Dong, X. Zhang, A. Alù, and P. Lu, "Spectrum control through discrete frequency diffraction in the presence of photonic gauge potentials," *Phys. Rev. Lett.*, vol. 120, p. 133901, 2018.
10. **D. L. Sounas** and A. Alù, "Fundamental bounds on the operation of fano non-linear isolators," *Phys. Rev. B*, vol. 97, p. 115431, 2018.
11. A. Kord, **D. L. Sounas**, and A. Alù, "Pseudo-linear-time-invariant magnet-less circulators based on differential spatio-temporal modulation of resonant junctions," *IEEE Trans. Microw. Theory Techn.*, vol. 66, pp. 2731–2745, 2018.
12. R. Fleury, **D. L. Sounas**, and A. Alù, "Non-reciprocal optical mirrors based on spatio-temporal modulation," *J. Opt.*, vol. 20, p. 034007, 2018.
13. A. Kord, **D. L. Sounas**, and A. Alù, "Achieving full-duplex communication: Magnet-less parametric circulators for full-duplex communication systems," *IEEE Microw. Mag.*, vol. 19, no. 1, pp. 84–90, 2018.
14. H. Chalabi, Y. Ra'di, **D. L. Sounas**, and A. Alù, "Efficient anomalous reflection through near-field interactions in metasurfaces," *Phys. Rev. B*, vol. 96, p. 075432, 2017.

15. **D. L. Sounas** and A. Alù, "Non-reciprocal photonics based on time-modulation," *Nature Photonics*, vol. 11, pp. 774–783, 2017, [This paper was highlighted in the cover of *Nature Photonics*].
16. **D. L. Sounas**, J. Soric, and A. Alù, "Broadband passive isolators with large efficiency based on coupled non-linear resonances," *Nature Electron.*, vol. 1, pp. 113–119, 2018, [This paper was featured in the cover of *Nature Electronics*].
17. A. Kord, **D. L. Sounas**, and A. Alù, "Magnet-less circulators based on spatio-temporal modulation of bandstop filters in a delta topology," *IEEE Trans. Microw. Theory Techn.*, vol. 66, no. 2, pp. 911–926, 2018.
18. Y. Ra'di, **D. L. Sounas**, and A. Alù, "Meta-gratings: Beyond the limits of graded metasurfaces for wavefront control," *Phys. Rev. Lett.*, vol. 119, p. 067404, 2017, [This paper has been selected as an **Editor's Suggestion**.]
19. T. Dinc, M. Tymchenko, A. Nagulu, **D. L. Sounas**, A. Alù, and H. Krishnaswamy, "Synchronized conductivity modulation to realize broadband lossless magnetic-free non-reciprocity," *Nat. Commun.*, vol. 8, p. 795, 2017.
20. F. Monticone, **D. L. Sounas**, and A. Alù, "Fundamental limitations on passive cloaking, and beyond," *Forum for Electromagnetic Research Methods and Applications Technologies (FERMAT)*, vol. 19, p. 4, Jan.-Feb. 2017.
21. **D. L. Sounas** and A. Alù, "Time-reversal symmetry bounds on the electromagnetic response of asymmetric structures," *Phys. Rev. Lett.*, vol. 118, p. 154302, 2017.
22. C. Coullais, **D. L. Sounas**, and A. Alù, "Static non-reciprocity in mechanical metamaterials," *Nature*, vol. 542, pp. 461–464, 2017.
23. D. Ramaccia, **D. L. Sounas**, A. Alù, A. Toscano, and F. Bilotti, "Doppler cloak restores invisibility for objects in relativistic motion," *Phys. Rev. B*, vol. 95, p. 075113, 2017.
24. R. Maas, S. A. Mann, **D. L. Sounas**, A. Alù, E. C. Garnett, and A. Polman, "Generalized antireflection coatings for complex bulk metamaterials," *Phys. Rev. B*, vol. 93, p. 195433, 2016.
25. Y. Ra'di, **D. L. Sounas**, A. Alù, and S. Tretyakov, "Parity-time-symmetric teleportation," *Phys. Rev. B*, vol. 93, p. 235427, 2016.
26. R. Fleury, **D. L. Sounas**, and A. Alù, "Parity-time symmetry in acoustics: Theory, devices, and potential applications," *IEEE J. Sel. Top. Quantum Electron.*, vol. 22, no. 5, p. 5000809, 2016.
27. **D. L. Sounas** and A. Alù, "Color separation through spectrally-selective optical funneling," *ACS Photonics*, vol. 3, no. 4, pp. 620–626, 2016.
28. D. Correas-Serrano, J. S. Gomez-Diaz, **D. L. Sounas**, Y. Hadad, A. Alvarez-Melcon, and A. Alù, "Non-reciprocal graphene devices and antennas based on spatio-temporal modulation," *IEEE Antenn. Wireless Propag. Lett.*, vol. 15, pp. 1529–1532, 2016.
29. N. Estep, **D. L. Sounas**, and A. Alù, "Magnet-less microwave circulators based on spatiotemporally-modulated rings of coupled resonators," *IEEE Trans. Microw. Theory Techn.*, vol. 64, no. 2, pp. 502–518, 2016.
30. D. Ramaccia, **D. L. Sounas**, A. Alù, F. Bilotti, and A. Toscano, "Non-reciprocal filtering horn antennas for satellite systems using angular momentum-biased metamaterial inclusions," *IEEE Trans. Antennas Propag.*, vol. 63, no. 12, pp. 5593–5600, 2015.
31. H. S. Skulason, **D. L. Sounas**, F. Mahvash, S. Francoeur, M. Siaj, C. Caloz, and T. Szkopek, "Field effect tuning of microwave Faraday rotation and isolation with large-area graphene," *Appl. Phys. Lett.*, vol. 107, p. 093106, 2015.
32. R. Fleury, **D. L. Sounas**, M. Haberman, and A. Alù, "Non-reciprocal acoustics," *Acoustics Today*, vol. 11, no. 3, pp. 14–21, 2015.
33. Y. Hadad, **D. L. Sounas**, and A. Alù, "Space-time gradient metasurfaces," *Phys. Rev. B*, vol. 92, 100304(R), 2015.
34. **D. L. Sounas**, R. Fleury, and A. Alù, "Unidirectional cloaking and super-stealth with parity-time symmetric metasurfaces," *Phys. Rev. Appl.*, vol. 4, p. 014005, 2015.
35. R. Fleury, **D. L. Sounas**, and A. Alù, "A subwavelength ultrasonic circulator based on spatio-temporal modulation," *Phys. Rev. B*, vol. 91, no. 17, p. 174306, 2015.
36. —, "An invisible acoustic sensor based on parity-time symmetry," *Nat. Commun.*, vol. 6, p. 5905, 2015.
37. N. A. Estep, **D. L. Sounas**, J. Soric, and A. Alù, "Magnetic-free non-reciprocity based on parametrically modulated coupled-resonator loops," *Nature Phys.*, vol. 10, pp. 923–927, 2014, [This paper has been featured on a **UT Austin press release**, Phys.org, **MIT Technology Review**. A News and Views commentary by Ari Sihvola appeared in the same issue.] DOI: 10.1038/nphys3134.

38. **D. L. Sounas** and A. Alù, "Optical isolation based on angular-momentum biasing," *Forum for Electromagnetic Research Methods and Application Technologies (FERMAT)*, vol. 6, no. 2, Nov. 18, 2014.
39. R. Fleury, **D. L. Sounas**, and A. Alù, "Negative refraction and planar focusing based on parity-time symmetric metasurfaces," *Phys. Rev. Lett.*, vol. 113, p. 123 903, 2014.
40. **D. L. Sounas** and A. Alù, "Extinction symmetry for reciprocal objects and its implications on cloaking and scattering manipulation," *Opt. Lett.*, vol. 39, no. 13, pp. 4053–4056, 2014.
41. —, "Angular-momentum-biased nanorings to realize magnetic-free integrated optical isolation," *ACS Photonics*, vol. 1, no. 3, pp. 198–204, 2014, [This paper has been selected to appear on the **cover of ACS Photonics**].
42. R. Fleury, **D. L. Sounas**, C. F. Sieck, M. R. Haberman, and A. Alù, "Sound isolation and giant linear nonreciprocity in a compact acoustic circulator," *Science*, vol. 343, no. 6170, pp. 516–519, 2014, [This paper has been selected to appear on the **cover of Science**. A perspective from S. Cummer has appeared on the same issue, pp. 495–496. News highlights have appeared on **NBC News, Phys.org, Science Daily, LiveScience**, among others].
43. **D. L. Sounas**, C. Caloz, and A. Alù, "Giant non-reciprocity at the subwavelength scale using angular momentum-biased metamaterials," *Nat. Commun.*, vol. 4, p. 2407, 2013.
44. N. Chamanara, **D. L. Sounas**, T. Szkopek, and C. Caloz, "Terahertz magnetoplasmon energy concentration and splitting in graphene pn junctions," *Opt. Express*, vol. 21, no. 21, pp. 25 356–25 363, 2013.
45. Q. Zhang, **D. L. Sounas**, S. Gupta, and C. Caloz, "Wave-interference explanation of group-delay dispersion in resonators (education column)," *IEEE Antennas Propag. Mag.*, vol. 55, no. 2, pp. 212–227, Apr. 2013.
46. N. Chamanara, **D. Sounas**, and C. Caloz, "Non-reciprocal magnetoplasmon graphene coupler," *Opt. Express*, vol. 21, no. 9, pp. 11 248–11 256, 2013.
47. **D. L. Sounas**, H. S. Skulason, H. V. Nguyen, A. Guermoune, M. Siaj, T. Szkopek, and C. Caloz, "Faraday rotation in magnetically biased graphene at microwave frequencies," *Appl. Phys. Lett.*, vol. 102, p. 191 901, 2013.
48. T. Kodera, **D. L. Sounas**, and C. Caloz, "Magnetless nonreciprocal metamaterial (MNM) technology: Application to microwave components," *IEEE Trans. Microw. Theory Tech.*, vol. 61, no. 3, pp. 1030–1042, Mar. 2013.
49. Q. Zhang, **D. Sounas**, and C. Caloz, "Synthesis of cross-coupled reduced-order dispersive delay structures (DDSs) with arbitrary group delay and controlled magnitude," *IEEE Trans. Microw. Theory Tech.*, vol. 61, no. 3, pp. 1043–1052, Mar. 2013.
50. S. Gupta, **D. Sounas**, Q. Zhang, and C. Caloz, "All-pass dispersion synthesis using microwave C-sections," *Int. J. Circ. Theor. Appl.*, 2013.
51. **D. L. Sounas**, T. Kodera, and C. Caloz, "Electromagnetic modeling of a magnet-less non-reciprocal gyrotropic metasurface," *IEEE Trans. Antennas Propag.*, vol. 61, no. 1, pp. 221–231, Jan. 2013.
52. S. Gupta, **D. L. Sounas**, H. V. Nguyen, Q. Zhang, and C. Caloz, "CRLH-CRLH C-Section dispersive delay structures with enhanced group-delay swing for higher analog signal processing resolution," *IEEE Trans. Microw. Theory Tech.*, vol. 60, no. 12, pp. 3939–3949, Dec. 2012.
53. T. Kodera, **D. L. Sounas**, and C. Caloz, "Switchable magnetless nonreciprocal metamaterial (MNM) and its application to a switchable Faraday rotation metasurface," *IEEE Antennas Wireless Propag. Lett.*, vol. 11, pp. 1454–1457, 2012.
54. N. Chamanara, **D. Sounas**, T. Szkopek, and C. Caloz, "Optically transparent and flexible graphene reciprocal and nonreciprocal microwave planar components," *IEEE Microw. Wireless Compon. Lett.*, vol. 22, no. 7, pp. 360–362, Jul. 2012.
55. A. I. Dimitriadis, **D. L. Sounas**, N. V. Kantartzis, C. Caloz, and T. D. Tsiboukis, "Surface susceptibility bianisotropic matrix model for periodic metasurfaces of uniaxially mono-anisotropic scatterers under oblique TE-wave incidence," *IEEE Trans. Antennas Propag.*, vol. 60, no. 12, pp. 5753–5767, Dec. 2012.
56. M. Dagher, N. Chamanara, **D. Sounas**, R. Martel, and C. Caloz, "Theoretical investigation of traveling-wave amplification in metallic carbon nanotubes biased by a DC Field," *IEEE Trans. Electron. Dev.*, vol. 11, no. 3, pp. 463–471, May 2012.
57. **D. L. Sounas** and C. Caloz, "Gyrotropy and non-reciprocity of graphene for microwave applications," *IEEE Trans. Microw. Theory Tech.*, vol. 60, no. 4, pp. 901–914, Apr. 2012.
58. T. Kodera, **D. L. Sounas**, and C. Caloz, "Non-reciprocal magnet-less CRLH leaky-wave antenna based on a ring metamaterial structure," *IEEE Antennas Wireless Propag. Lett.*, pp. 1551–1554, Dec. 2011.
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