# Curriculum vitae di *Andrea Alù*

Sottosettori ERC primari (max 3): *PE2_9, PE2_12, PE2_16*
Eventuali sottosettori ERC secondari (max 3): *PE11_13, PE3_10, PE7_5*

## PERSONAL DETAILS

Family name, First name: Alù, Andrea
Birthdate: September 27, 1978
Researcher unique identifier(s) (such as ORCID, Research ID, etc. ...): 0000-0002-4297-5274
URL for web site: http://alulab.org/

- **Education and key qualifications**

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|---|---|
| 27/04/2007 | PhD<br>Electrical Engineering, University of Roma Tre, Italy |
| 2004 | Master<br>Environmental Engineering and Economics, University of Roma Tre, Italy |
| 2001 | Laurea<br>Electrical Engineering, University of Roma Tre, Italy |

- **Current position(s)**

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|---|---|
| 2025 | Visiting Professor<br>Applied Physics, La Sapienza University, Italy |
| 2022 - Present | Distinguished Professor<br>City University of New York (CUNY), USA |
| 2018 – Present | Einstein Professor of Physics<br>Physics, CUNY Graduate Center, USA |
| 2018 – Present | Founding Director<br>Photonics Initiative, CUNY Advanced Science Research Center, USA |
| 2018 – Present | Professor<br>Electrical Engineering, City College of New York, USA |

- **Previous position(s)**

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| 2018 – 2024 | Senior Research Scientist, Adjunct Professor<br>Electrical and Computer Engineering, The University of Texas at Austin, USA |
| 2016 – 2018 | Temple Foundation Endowed Professor (Full Professor)<br>Electrical and Computer Engineering, The University of Texas at Austin, USA |
| 2013 – 2016 | Cockrell Family Dean's Chair in Engineering Excellence (Associate Professor)<br>Electrical and Computer Engineering, The University of Texas at Austin, USA |
| 2009 – 2013 | Assistant Professor<br>Electrical and Computer Engineering, The University of Texas at Austin, USA |
| 2007 – 2008 | Postdoctoral Fellow<br>Electrical and Systems Engineering, University of Pennsylvania, USA |

## RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

### Research achievements

Prof. Alù has published over 850 journal papers in highly selective journals, with >95,000 citations to date (h-index: 153). A complete list may be found at http://alulab.org/. Among his achievements, he has introduced magnet-free non-reciprocal metamaterials for sound, light and radio-waves [1-2], he discovered topological polaritons in various material systems [3-5], he introduced time-metamaterials [6-7], he demonstrated

broken time-reversal symmetry for static mechanics, antenna radiation and thermal emission [8-10], he unveiled extreme optical nonlinearities in quantum-engineered metasurfaces [11], he introduced complex frequency excitations [12-13] and demonstrated exceptional point and non-Hermitian phenomena [14-15] in optics, he unveiled nonlocal metasurfaces for wavefront control [16-17] and optical computing [18-19], and introduced metamaterial cloaking [20].


1. 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, January 31, 2014.
2. N. Estep, D. Sounas, J. Soric, and A. Alù, *"Magnetic-Free Non-Reciprocity Based on Parametrically Modulated Coupled-Resonator Loops,"* Nature Physics, Vol. 10, No. 12, pp. 923-927, December 1, 2014.
3. G. Hu, Q. Ou, G. Si, Y. Wu, J. Wu, Z. Dai, A. Krasnok, Y. Mazor, Q. Zhang, Q. Bao, C. W. Qiu, and A. Alù, *"Topological Polaritons and Photonic Magic Angles in Twisted α-$MoO_3$ Bilayers,"* Nature, Vol. 582, pp. 209-213, June 11, 2020.
4. S. Guddala, F. Komissarenko, S. Kiriushechkina, A. Vakulenko, M. Li, V. M. Menon, A. Alù, and A. B. Khanikaev, *"Topological Phonon-Polariton Funneling in Midinfrared Polaritonic Metasurfaces,"* Science, Vol 374, No. 6564, pp. 225-227, October 8, 2021.
5. F. Dirnberger, J. Quan, R. Bushati, G. M. Diederich, M. Florian, J. Klein, K. Mosina, Z. Sofer, X. Xu, A. Kamra, F. J. García-Vidal, A. Alù, and V. M. Menon, *"Magneto-Optics in a Van der Waals Magnet Tuned by Self-Hybridized Polaritons,"* Nature, Vol. 620, pp. 533-537, August 16, 2023.
6. H. Moussa, G. Xu, S. Yin, E. Galiffi, Y. Ra'di, and A. Alù, *"Observation of Temporal Reflection and Broadband Frequency Conversion at Photonic Time Interfaces,"* Nature Physics, Vol. 19, No. 6, pp. 863-868, June 15, 2023.
7. E. Galiffi, G. Xu, S. Yin, H. Moussa, Y. Ra'di, and A. Alù, *"Broadband Coherent Wave Control Through Photonic Collisions at Time Interfaces,"* Nature Physics, Vol. 19, No. 11, pp. 1703-1708, November 2023.
8. C. Coulais, D. L. Sounas, and A. Alù, *"Static Non-Reciprocity Using Mechanical Metamaterials,"* Nature, Vol. 542, No. 7642, pp. 461-464, February 13, 2017.
9. Y. Hadad, J. Soric, and A. Alù, *"Breaking Temporal Symmetries for Emission and Absorption,"* Proceedings of the National Academy of Sciences, Vol. 113, No. 13, pp. 33471-33475, March 29, 2016.
10. M. Cotrufo, A. Cordaro, D. L. Sounas, A. Polman, and A. Alù, *"Passive Bias-Free Nonreciprocal Metasurfaces Based on Thermally Nonlinear Quasi-Bound States in the Continuum,"* Nature Photonics, Vol. 18, No. 1, pp. 81-90, January 2024.
11. J. Lee, M. Tymchenko, C. Argyropoulos, P. Y. Chen, F. Lu, F. Demmerle, G. Boehm, M. C. Amann, A. Alù, and M. A. Belkin, *"Giant Nonlinear Response from Plasmonic Metasurfaces Coupled to Intersubband Transitions,"* Nature, Vol. 511, No. 7507, pp. 65-69, July 2, 2014.
12. S. Kim, Y. G. Peng, S. Yves, and A. Alù, *"Loss Compensation and Superresolution in Metamaterials with Excitations at Complex Frequencies,"* Physical Review X, Vol. 13, No. 4, 041024 (9 pages), November 3, 2023.
13. S. Kim, A. Krasnok, and A. Alù, *"Complex-Frequency Excitations in Photonics and Wave Physics,"* Science, Vol. 387, No. 6741, p. 1370 (12 pages), March 28, 2025.
14. M. A. Miri, and A. Alù, *"Exceptional Points in Optics and Photonics,"* Science, Vol. 363, No. 6422, p. 42 (11 pages), January 4, 2019.
15. A. Li, H. Wei, M. Cotrufo, W. Chen, S. Mann, X. Ni, B. Xu, J. Chen, J. Wang, S. Fan, C. W. Qiu, A. Alù, and L. Chen, *"Exceptional Points and Non-Hermitian Photonics at the Nanoscale,"* Nature Nanotechnology, Vol. 18, No. 7, pp. 706-720, July 2023.
16. A. Overvig, and A. Alù, *"Diffractive Nonlocal Metasurfaces,"* Laser and Photonics Reviews, Special Issue Special Issue 15th Anniversary Laser and Photonics Reviews, Vol. 16, No. 8, 2100633 (16 pages), August 1, 2022.
17. G. Xu, A. Overvig, Y. Kasahara, E. Martini, S. Maci and A. Alù, *"Arbitrary Aperture Synthesis with Nonlocal Leaky-Wave Metasurface Antennas,"* Nature Communications, Vol. 14, No. 4380 (11 pages), July 20, 2023.
18. A. Silva, F. Monticone, G. Castaldi, V. Galdi, A. Alù, and N. Engheta, *"Performing Mathematical Operations with Metamaterials,"* Science, Vol. 343. No. 6167, pp. 160-163, January 10, 2014
19. H. Kwon, D. L. Sounas, A. Cordaro, A. Polman, and A. Alù, *"Nonlocal Metasurfaces for Optical Signal Processing,"* Physical Review Letters, Vol. 121, No. 17, 173004 (6 pages), October 24, 2018.
20. A. Alù, and N. Engheta, *"Achieving Transparency with Plasmonic and Metamaterial Coatings,"* Physical Review E, Vol. 72, No. 1, 016623 (9 pages), July 26, 2005.

**Peer recognition**

Prof. Alù is a Fellow of 7 professional societies: the National Academy of Inventors (NAI), the American Association for the Advancement of Science (AAAS), the Institute of Electrical and Electronic Engineers (IEEE), the Materials Research Society (MRS), Optica (former Optical Society of America), the International Society for Optics and Photonics (SPIE) and the American Physical Society (APS).

He has been elected a Highly Cited Researcher every year since 2017, he is a Simons Investigator in Physics since 2016, and has received a large number of prestigious awards, including the following:

- *Max Born Award* (2024), Optica, 'For pioneering contributions to linear, nonlinear and nonreciprocal photonic metamaterials'
- *Mozi Award* (2024), SPIE, 'For seminal contributions to the field of optical metamaterials as well as their applications for wavefront manipulation and enhancement of nonreciprocal and nonlinear phenomena'
- *William Streifer Scientific Achievement Award* (2024), IEEE Photonics Society, 'For seminal contributions to the field of photonic metamaterials and their applications'
- *IEEE Antennas and Propagation Distinguished Achievement Award* (2023), Institute of Electrical and Electronic Engineers
- *Brillouin Medal* (2021), International Phononics Society
- *Blavatnik National Award for Young Scientists (Laureate)* (2021), Blavatnik Foundation and New York Academy of Sciences
- *AAAFM Heeger Award* (2021), American Association for Advances in Functional Materials, 'For his seminal contributions to the realization of engineered functional materials and metamaterials, and their applications in electromagnetics, photonics and acoustics'
- *Dan Maydan Prize in Nanoscience and Nanotechnology* (2021), The Hebrew University of Jerusalem, 'For his seminal contributions to nano-optics, nano-photonics, plasmonics and phononics, including the discovery of giant non-reciprocity, non-linear phenomena, and enhanced light-matter interactions using nanostructured materials, metasurfaces and metamaterials'
- *IEEE Kiyo Tomiyasu Award* (2020), Institute of Electrical and Electronic Engineers, 'For contributions to novel electromagnetic materials and their application'
- *Vannevar Bush Faculty Fellowship* (2019), U.S. Department of Defense
- *ICO Prize in Optics* (2016), International Commission for Optics, 'For his groundbreaking work on metatronics for ultrafast electronics and the localization of optical radiation in structured materials'
- *Edith and Peter O'Donnell Award in Engineering*, The Academy of Medicine, Engineering and Science of Texas (2016), 'For a number of groundbreaking, highly-cited and recognized contributions to science and engineering. These contributions include seminal work on cloaking and invisibility, pioneering advances in optical nanocircuits and nanoantennas, magnetic-free non-reciprocal devices for sound, radio-waves and light, and giant nonlinear response in optical metamaterials.'
- *National Science Foundation (NSF) Alan T. Waterman Award* (2015), 'For his work in metamaterial theory and design, including insightful contributions to plasmonic cloaking; effective light manipulation at the nano scale; innovative ideas in breaking time reversal symmetry leading to enhanced non-reciprocity from acoustics to microwaves and optics; and for unique contributions to metamaterials'
- *Franco Strazzabosco Award for Young Engineers* and *Medal of Representation of the President of the Republic of Italy* (2014), 'For innovative, impactful research that honors Italy'
- *OSA Adolph Lomb Medal* (2013), 'For outstanding contributions to the fields of optical metamaterials and plasmonic optics, and for development of the concept of plasmonic cloaking'
- *International Union of Radio Science (URSI) Issac Koga Gold Medal* (2011), 'For contributions to the theory and application of electromagnetic metamaterials, in particular the conception of plasmonic-based cloaking, optical nanocircuits, and anomalous propagation and radiation in metamaterials'
- *Leopold B. Felsen Award for Excellence in Electrodynamics* (2008)

## ADDITIONAL INFORMATION

**Other contributions to the research community**

In 2018, he has established the Photonics Initiative at the City University of New York, where he currently leads a world-renowned research and education program focused on metamaterials and photonic technologies. He serves as the President of Metamorphose, as the Director of the Simons Collaboration on Extreme Wave

Phenomena, as Editor-in-Chief of Optical Materials Express, and as Chair of Scientific Council of the Italian Scholars and Scientists of North America Foundation (ISSNAF).

He is also Chief Technology Officer of Silicon Audio, a company established in 2014 and focused on commercializing his inventions in the area of radio-frequency and acoustic technologies. He holds over 50 patents and patent applications in the area of metamaterial technologies.