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He is a faculty member at the Technion Faculty of Electrical Engineering. He studies the fundamentals of light-matter interactions in nanophotonics and in settings of 2D materials, developing new concepts for light generation in spectral ranges inaccessible by existing technology. Ido's research specifically focuses on the light-matter interactions of shaped particle wavefunctions, in which he made contributions to the quantum electrodynamics of relativistic electron wavefunctions. Ido is an Azrieli Faculty Fellow and won a Rothschild Fellowship, MIT-Technion Scholarship, and a Marie Curie Fellowship, for his postdoc. During his PhD, Ido has discovered new classes of accelerating beams in nonlinear optics and electromagnetism, for which he received the 2012 Israel Physical Society Prize, and the 2014 APS Award for Outstanding Doctoral Dissertation in Laser Science.

Publications List

2018

56. X. Lin, S. Easo, Y. Shen, H. Chen, B. Zhang, J. D. Joannopoulos, M. Soljačić, and I. Kaminer‡, Controlling Cherenkov angles with resonance transition radiation, *Nature Phys.*, (2018) Accepted.
55. Y. Kurman, N. Rivera, T. Christensen, S. Tsesses, M. Orenstein, M. Soljačić, J. D. Joannopoulos and I. Kaminer‡, Controlling emitter frequency by increasing photon momentum, *Nature Photonics* (2018), Accepted.
54. J. J. López, A. Ambrosio, S. Dai, C. Huynh, D. C. Bell, X. Lin, N. Rivera, S. Huang, Q. Ma, S. Eghus, I. Kaminer, K. Watanabe, T. Taniguchi, J. Kong, D. N. Basov, P. Jarillo-Herrero, M. Soljačić, Characterization of sub-40 nm h-BN nanostructures patterned via high-resolution ion beam, *Small* (2018), Accepted.
53. C. Qian, X. Lin, Y. Yang, F. Gao, Y. Shen, J. Lopez, I. Kaminer, B. Zhang, E. Li, M. Soljačić, and H. Chen, Multifrequency superscattering from subwavelength hyperbolic structures, *ACS Photonics*. (2018), Accepted.
52. E. Pomarico, I. Madan, G. Berruto, G. M. Vanacore, K. Wang, I. Kaminer, F. J. García de Abajo, and F. Carbone, meV resolution in laser-assisted energy-filtered transmission electron microscopy, *ACS Photonics*. 5 (3), 759–764 (2018).
51. H. Larocque, I. Kaminer, V. Grillo, R. W Boyd, E. Karimi, Twisting neutrons may reveal their internal structure, *Nature Phys.* 14, 1-2. (2018). (Correspondence)
50. J. Sloan, N. Rivera, M. Soljačić, and I. Kaminer‡, Tunable UV-emitters through Graphene Plasmonics, *Nano Lett.* 18, 308-313 (2018).

2017

49. H. Larocque, I. Kaminer, V. Grillo, G. Leuchs, M. J. Padgett, R. W. Boyd, M. Segev, and E. Karimi, "Twisted" Electrons, *Contemporary of Physics* (2017).

48. N. Rivera, G. Rosolen, J. D. Joannopoulos, I. Kaminer and M. Soljačić, Making two-photon processes dominate one-photon processes using mid-IR phonon polaritons, PNAS, 114 (52) 13607-13612(2017).

47. R. Remez, N. Shapira, C. Roques-Carmes, R. Tirole, Y. Lereah, M. Soljačić, I. Kaminer, and A. Arie, Spectral and spatial shaping of Smith Purcell Radiation, Phys. Rev. A, 96, 061801 (Rapid Communication) (2017).

46. L. J. Wong, K.-H. Hong, S. Carbajo, A. Fallahi, P. Piot, M. Soljačić, J. D. Joannopoulos, F. X. Kärtner, and I. Kaminer, Laser-Induced Linear-Field Particle Acceleration in Free Space, Scientific Reports 7, 11159 (2017).

(Supplementary materials)

Related videos: (1, 2, 3)

45. C.-H. Chang, N. Rivera, J. D. Joannopoulos, M. Soljačić, and I. Kaminer, Constructing “designer atoms” via resonant graphene-induced lamb shifts, ACS Photonics 4 (12), 3098–3105 (2017). Invited article

44. L. J. Wong, and I. Kaminer, Ultrashort Tilted-Pulse-Front Pulses and Nonparaxial Tilted-Phase-Front Beams, ACS Photonics 4, 2257 (2017).

43. Y. Hadad, E. Cohen, I. Kaminer, and A. C. Elitzur, Covariant electromagnetic field lines, J. Phys.: Conf. Ser. 880, 012052 (2017).

42. M. Mutzafi, I. Kaminer, G. Harari and M. Segev, Non-Diffracting Electron Vortex Beams Balancing Their Electron-Electron Interactions, Nature Comm. 8, 650 (2017).

41. O. Ilic, I. Kaminer, B. Zhen, H. Buljan, O. Miller, and M. Soljačić, Topologically enabled optical nanomotors, Science Advances 3, e1602738 (2017).

§ Featured on the MIT front page.

40. X. Lin, Y. Yang, N. Rivera, J. J. López, Y. Shen, I. Kaminer, H. Chen, J. D. Joannopoulos, and M. Soljačić, All-angle negative refraction of highly squeezed plasmon and phonon polaritons in graphene-boron nitride heterostructures, PNAS 114, 6717 (2017).

(Supplementary materials)

§ Selected for Research Highlights in Nature Photonics

39. L. J. Wong, and I. Kaminer, Abruptly Focusing and Defocusing Needles of Light and Closed-Form Electromagnetic Wavepackets, ACS Photonics 4, 1131 (2017).

(Supplementary materials).

38. S. Tsesses, G. Bartal, and I. Kaminer, Light generation via quantum interaction of electrons with periodic nanostructures, Phys. Rev. A 95, 013832 (2017).

37. X. Lin, I. Kaminer, X. Shi, F. Gao, Z. Yang, Z. Gao, H. Buljan, J. D. Joannopoulos, M. Soljačić, H. Chen, B. Zhang, Splashing transients of 2D plasmons launched by swift electrons, Science Advances 3, e1601192 (2017).

(Supplementary Materials and Movie showing time evolution of 2D plasmons launched by swift electrons)

36. I. Kaminer, S. E. Kooi, R. Shilo, B. Zhen, R. Remez, Y. Shen, J. Lopez, Y. Yang, J. D. Joannopoulos, A. Arie, and M. Soljačić, Spectrally and spatially resolved Smith-Purcell radiation in plasmonic crystals with short-range disorder, Phys. Rev. X 7, 011003 (2017).

(Supplementary materials)

2016

35. E. C. Regan, Y. Igarashi, B. Zhen, I. Kaminer, C. W. Hsu, Y. Shen, J. D. Joannopoulos, and M. Soljačić, Direct imaging of isofrequency contours in photonic structures, *Science Advances* 2, e1601591 (2016).

34. I. Kaminer, S. E. Kooi, R. Shilo, B. Zhen, R. Remez, Y. Shen, J. Lopez, Y. Yang, J. D. Joannopoulos, A. Arie, and M. Soljačić, Spectrally and spatially resolved Smith-Purcell radiation in plasmonic crystals with short-range disorder, *Phy. Rev. X* 7, 011003 (2017).

(Supplementary materials)

33. H. Koren, I. Kaminer, and D. R. Raban, The Interplay between Individual Decisions and Structural Network Properties in the Diffusion of Information, *PLoS One* 11, e0164651 (2016).

32. P. Aleahmad, H. M. Cessa, I. Kaminer, M. Segev, and D. N. Christodoulides, Dynamics of accelerating solutions of Maxwell's equations, *JOSA A* 33, 2047-2052 (2016).

31. X. Lin, Y. Shen, I. Kaminer, H. Chen, and M. Soljačić, Transverse-Electric Brewster Effect Enabled by Nonmagnetic 2D Materials, *Phys. Rev. A* 94, 023836 (2016).

30. H. Herzig Sheinfux, I. Kaminer, A. Z. Genack, and M. Segev, Interplay between evanescence and disorder in deep subwavelength structures, *Nature Comm.* 7, 12927 (2016).

29. N. Rivera†, I. Kaminer†, B. Zhen, J. D. Joannopoulos, and M. Soljačić, Shrinking light to allow forbidden transitions on the atomic scale, *Science* 353, 263 (2016).

(Supplementary materials)

28. I. Kaminer, Y. Tenenbaum Katan, H. Buljan, Y. Shen, O. Ilic, J. J. Lopez, L. J. Wong, J. D. Joannopoulos, M. Soljačić, Efficient plasmonic emission by the quantum Čerenkov effect from hot carriers in graphene, *Nature Comm.* 7, 11880 (2016).

(supplementary materials)

§ Received commentary in tens of magazines including the Daily Mail.

27. I. Kaminer, M. Mutzafi, A. Levy, G. Harari, H. Herzig Sheinfux, S. Skirlo, J. Nemirovsky, J. D. Joannopoulos, M. Segev, M. Soljačić, Quantum Čerenkov Radiation: Spectral Cutoffs and the Role of Spin and Orbital Angular Momentum, *Phy. Rev. X* 6, 011006 (2016).

§ Selected for Research Highlights in Nature Physics.

26. O. Ilic, I. Kaminer, Y. Lahini, H. Buljan, and M. Soljačić, Exploiting Optical Asymmetry for Controlled Guiding of Particles with Light, *ACS Photonics* 3, 197 (2016).

25. L. J. Wong†, I. Kaminer†, O. Ilic, J. D. Joannopoulos, and M. Soljačić, Toward Graphene Plasmon-Based Free-Electron IR to X-ray Sources, *Nature Photonics* 10, 46 (2016).

(Supplementary materials)

§ Featured on the MIT front page, and was also selected for News & Views in Nature Photonics.

2015

24. B. Zhen, C. W. Hsu, Y. Igarashi, L. Ling, I. Kaminer, A. Pick, S.-L. Chua, J. D. Joannopoulos, and M. Soljačić, Spawning rings of exceptional points out of Dirac cones, *Nature* 525, 354 (2015).

(Supplementary materials)

23. Y. Lumer, Y. Liang, R. Schley, I. Kaminer, E. Greenfield, D. Song, X. Zhang, J. Xu, Z. Chen, and M. Segev, Incoherent self-accelerating beams, *Optica* 2, 886 (2015).

22. I. Kaminer, J. Nemirovsky, M. Rechtsman, R. Bekenstein, and M. Segev, Self-accelerating Dirac particles and prolonging the lifetime of relativistic fermions, *Nature Phys.* 11 261(2015).

(Supplementary materials)

§ Published as the journal cover of *Nature Physics*. It was also selected for *News & Views in Nature Physics*, and received commentary in several magazines.

21. Y. Hadad, E. Cohen, I. Kaminer, and A. C. Elitzur, The hidden geometry of electromagnetism, *J. Phys.: Conf. Ser.* 626 012024 (2015).

2014

20. H. Herzig Sheinfux, I. Kaminer, Y. Plotnik, G. Bartal, and M. Segev, Subwavelength Multilayer Dielectrics: Ultrasensitive Transmission and Breakdown of Effective-Medium Theory, *Phys. Rev. Lett.* 113, 243901 (2014).

19. R. Schley[†], I. Kaminer[†], E. Greenfield[†], R. Bekenstein, Y. Lumer, and M. Segev, Loss-proof self-accelerating beams and their use in non-paraxial manipulation of particles trajectories, *Nature Comm.* 5, 5189 (2014).

(supplementary materials, video)

18. L. Oren, L. Levi, I. Orr, R. A. Nemirovsky, J. Nemirovsky, I. Kaminer, M. Segev, and O. Cohen Long-lived waveguides and sound-wave generation by laser filamentation, *Phys. Rev. A (Rapid Communication)* 90, 021801 (2014).

17. H. Koren, I. Kaminer, and D. R. Raban, Exploring the Effect of Reinvention on Critical Mass Formation and the Diffusion of Information in Social Networks, *SNAM* 4, 185 (2014)

16. K. G. Makris, I. Kaminer, R. El-Ganainy, N.K. Efremidis, Z. Chen, M. Segev, and D.N. Christodoulides, Accelerating diffraction-free beams in photonic lattices, *Opt. Lett.* 39, 2129 (2014).

15. R. Bekenstein, J. Nemirovsky, I. Kaminer, and M. Segev, Shape-preserving accelerating electromagnetic wavepackets in curved space, *Phys. Rev. X* 4, 011038 (2014).

2013

14. I. Kaminer[†], J. Nemirovsky[†], and M. Segev, Optimizing 3D multiphoton fluorescence microscopy, *Opt. Lett.* 38, 3945 (2013).

13. M. A. Bandres, M.A. Alonso, I. Kaminer, and M. Segev, Three dimensional accelerating electromagnetic waves, *Opt. Express* 21, 13917 (2013).

12. M. A. Bandres, I. Kaminer, M. Mills, B.M. Rodriguez-Lara, E. Greenfield, M. Segev, and D.N. Christodoulides, Accelerating optical beams, *Optics and Photonics News* 24, 30 (2013). Review article

11. I. Kaminer, J. Nemirovsky, K. G. Makris, and M. Segev, Self-accelerating beams in photonic crystals, *Opt. Express* 21, 8886 (2013).

Before 2012

10. I. Kaminer, E. Greenfield, R. Bekenstein, J. Nemirovsky, M. Segev, A. Mathis, L. Froehly, F. Courvoisier, and J. M. Dudley, Accelerating Beyond the Horizon, *Optics and Photonics News* 23, 26 (2012).

(December special issue "Optics in 2012")

9. P. Aleahmad, M.-A. Miri, M. S. Mills, I. Kaminer, M. Segev, and D. N. Christodoulides, Fully vectorial accelerating diffraction-free Helmholtz beams, *Phys. Rev. Lett.* 109, 203902 (2012).

§ This article was selected for Physics Synopsis (by the APS) and also received commentary in *Physics World* magazine.

8. I. Kaminer, J. Nemirovsky, and M. Segev, Self-accelerating self-trapped nonlinear beams of Maxwell's equations, *Opt. Express* 20, 18827 (2012).

7. I. Kaminer, R. Bekenstein, J. Nemirovsky, and M. Segev, Nondiffracting accelerating wave packets of Maxwell's equations, *Phys. Rev. Lett.* 108, 163901 (2012).

§ This article was selected for Editors' Suggestion at PRL and for Viewpoint in *Physics* spotlighting exceptional research. It also received commentary in *Science* magazine and in *New Scientist* magazine.

6. I. Dolev, I. Kaminer, A. Shapira, M. Segev, and A. Arie, Experimental Observation of Self-Accelerating Beams in Quadratic Nonlinear Media, *Phys. Rev. Lett.* 108, 113903 (2012).

5. I. Kaminer, Y. Lumer, M. Segev and D.N. Christodoulides, Causality effects on accelerating light pulses, *Opt. Express* 19, 23132 (2011).

4. I. Kaminer, M. Segev and D.N. Christodoulides, Self-Accelerating Self Trapped Optical Beams, *Phys. Rev. Lett.* 106, 213902 (2011).

3. I. Kaminer, M. Segev, and A.M. Bruckstein, Stochastic recurrent dynamics of complex systems of solitons, *Phys. Rev. Lett.* 105, 083901 (2010).

(supplementary materials)

2. I. Kaminer, M. Segev, Y.C. Eldar, and A.M. Bruckstein, Solitonets: complex networks of interacting fields, *Proc. R. Soc. A* 465, 1093 (2008).

(Animation 1, Animation 2, Animation 3)

1. I. Kaminer, C. Rotschild, O. Manela, and M. Segev, Periodic solitons in nonlocal nonlinear media, *Opt. Lett.* 32, 3209 (2007).