Curriculum Vitae

Amir Capua

Personal: Born In Rehovot, Israel, February 28, 1979
Citizenship: Israel
Permanent address: Ha Harchava st., 83, Kibutz Hulda, Israel.
Present address: Shiler st., 4B/6, Jerusalem, Israel.
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Education:

2006 B.Sc. (Cum Laude) in Electrical Engineering,
Technion - Israel Institute of Technology, Haifa.
Specialized fields: Electro Optics, Microelectronics, Communication.

2013 Ph.D. (Direct track) in the Electrical Engineering
Technion - Israel Institute of Technology, Haifa.
Thesis Title: "Dynamical processes in nanometric semiconductor lasers and optical amplifiers"
Supervisor: Prof. Gadi Eisenstein, faculty of Electrical Engineering, Technion.

Work Experience:

2004-2007 Research and development, Intel Design Center, Haifa, Israel

2007-2013 Research position, Technion, Haifa, Israel

2013-2016 Postdoctoral fellow, IBM Research Laboratories, Almaden, California
Topic: Magneto-electronics, Spinaps group.
Principal Investigator: Prof. Stuart Parkin.

2016-2017 Research staff member, Max-Planck Institute of Microstructure, Halle, Germany. Director: Prof. Dr. Stuart Parkin.

2017-present Assistant professor, Applied Physics Department, Hebrew University, Jerusalem, Israel

Army Service:
1997-2001 Air Force Field Officer – Captain in reserve duty.

Computer Skills:
Programming skills in Matlab.
Programming in UNIX & TCL.
Programming skills in Labview.

Courses Tutoring:
Introduction to VLSI , 2007, Faculty of Electrical Engineering, Technion.

Projects:

1. Amir Capua, **"Phase lock loop synthesizer operating at 10 GHZ",** Supervised By Moshe Namer, Communication Lab, Faculty of Electrical Engineering, Technion, 2006.

Honors:
1. Best Poster Award in the NATO Advanced Study Institute on Nano Structured Materials for Advanced Technological Applications, 2008.
2. Awarded the Wolf prize, 2008/2009.
3. Awarded the Russell Berrie scholarship 2009.
4. Daniel fellowship 2009/2010.
5. Clore fellowship 2010.
6. Awarded the Russell Berrie scholarship 2010.
7. Fulbright post-doctoral fellowship 2012.
8. Feder Family Award 2013, 1'st prize.
9. Viterbi Fellowship 2013.
10. Brojde Fellowship 2018.

Conference Contributions:

1. The Conference on Lasers and Electro-Optics, ECOC 2007, **"Direct observation of the coherent spectral hole in the noise spectrum of a saturated InAs/InP**

quantum dash amplifier operating near 1550 nm".

2. European Semiconductor Laser Workshop ESLW '07, **"Direct correlation between a highly damped modulation response and ultra low relative intensity noise in an InAs/GaAs quantum dot laser".**

3. NATO Advanced Study Institute - Nano Structured Materials for Advanced Technological Applications, 2008, **"Multi Channel Signal Processing in Quantum-Dash Semiconductor Optical Amplifier",** Best Poster Award

4. International semiconductor laser conference, ISLC 2008, **"Cross talk free multi channel processing of 10 Gbit/s data via four wave mixing in a 1550 nm InAs/InP quantum dash amplifier".**

5. The Conference on Lasers and Electro-Optics, CLEO 2008, **"High Speed Cross Gain Modulation Using Quantum Dot Semiconductor Optical Amplifiers at 1.3 μm".**

6. International Nano-Optoelectronic Workshop, INOW 2009, **"Cross talk free multi channel processing of 10 Gbit/s data via four wave mixing in a 1550 nm InAs/InP quantum dash amplifier".**

7. The Conference on Lasers and Electro-Optics, CLEO 2010, **"Multi-wavelength femtosecond pump-probe characterization of 1550 nm InAs/InP quantum dash optical amplifiers".**

8. RBNI fall symposium 2010, **"Dynamical processes in nanometric semiconductor lasers and optical amplifiers".**

9. The Conference on Lasers and Electro-Optics, CLEO 2011,**"Multi Wavelength Characterization of Ultra Fast Carrier Dynamics in InAs/InP Quantum Dash Optical Amplifiers".**

10. 38th International Symposium on Compound Semiconductors, ISCS 2011. **"Direct observation of unique ultrafast broad band carrier dynamics in 1550 nm InAs/InP quantum dash optical amplifiers".**

11. European Conference on Optical Communication - ECOC 2011, **"Two Photon Induced Lasing in 1550 nm Quantum Dash Optical Gain Media".**

12. European Semiconductor Laser Workshop, ESLW 2011**, "Sub 100 fs Dynamics in Quantum Dash Semiconductor Gain Media"**

13. RBNI fall symposium 2012, **"Multi-Wavelength Pump-Probe Measurment of Gain Dynamics in Optical Semiconductor Amplifiers Based on Quantum Dots".**

14. 20'th International Symposium Nanostructures: Physics and Technology, 2012, **"Ultrafast dynamics in semiconductor nano-structure based optoelectronic devices"** -*Invited paper*

15. 24'th International Conference on Indium Phosphide and Related Materials, 2012, **"QD Devices Based on InAs Quantum Dashes"** **-** *Invited paper*

16. Nonlinear Dynamics in Semiconductor Lasers, NDSL 2012, **"Dynamical properties of nano structure semiconductor lasers and amplifiers"** **-** *Invited paper*

17. Nonlinear Dynamics in Semiconductor Lasers, NDSL 2012**, "FDTD model for a quantum-dot laser and amplifier under the Maxwell-Schrödinger framework"**

18. European Semiconductor laser workshop, ESLW 2012, **"Probing the Non-Linear Dynamics of InAs/InP Quantum Dot Laser with Ultra-Short Pulses"**

19. International semiconductor laser conference, ISLC 2012, **"Nonlinear transmission of ultra-short pulses in an oscillating InA/InP quantum dot laser"**

20. SPIE photonic west 2013, **"Ultra-fast phenomena in QD/QDash lasers" - *Invited paper***

21. French – Israeli symposium on nonlinear and quantum optics, FRISNO – 12, 2013, **"Direct observation of the coherent light-matter interaction in room-temperature semiconductors"**

22. French – Israeli symposium on nonlinear and quantum optics, FRISNO – 12, 2013, **"Non-Linear propagation of ultra-short pulses in an InAs/InP quantum dot laser"**

23. DPG Spring Meeting of the Condensed Matter Section 2013, **"Coherent phenomena in QD/QDash lasers" -** *Invited paper*

24. Workshop on Quantum Simulations and Related Topics On the occasion of the award of the Wolf prize to Peter Zoller and Ignacio Cirac, 2013, **"Direct observation of the quantum coherent light-matter interaction in room-temperature semiconductors" –** *Invited Paper*

25. The 25th international conference on Indium-Phosphide and related materials, IPRM 2013, **"Highly non-linear phenomena and coherent effects in 1500 nm QD lasers and amplifiers"** – *Invited paper*

26. International Nano –Optics Workshop, INOW 2013, **"1 picosecond long manifestation of coherent light-matter interactions in quantum-dot semiconductor amplifier operating at 300˚K"**

27. International Nano –Optics Workshop, INOW 2013, **"Coherent effects in room temperature semiconductors"** - *Invited paper*

28. 4th International Workshop on Epitaxial Growth and Fundamental Properties of Semiconductor Nanostructures, SemiconNano 2013, **"Rabi oscillations in room temperature nano-structured semiconductor gain media"** – *Invited paper*

29. Fundamental Optical processes in Semiconductors, FOPS 2013, **"Coherent Effects in Active Semiconductors at 300K: Rabi Oscillations and Self-Induced Transparency in QDot Optical Amplifiers"**

30. Gordon Research Seminar, on Ultrafast Phenomenon in Cooperative Systems, GRS 2014, **"Phase reconstruction of the electronic wavefunction in a 300K nanostructured semiconductor optical amplifier"**

31. Gordon Research Conference, on Ultrafast Phenomenon in Cooperative Systems, GRC 2014, **"Coherent manipulation of electronic states in a room temperature semiconductor optical amplifier"**

32. 26'th International Conference on Indium Phosphide and Related Materials, IPRM 2014, **"Carrier Dynamics in Inhomogeneously Broadened InAs/InP Quantum-Dot Optical Amplifiers"**

33. SPIE Photonics Europe 2014,**"Quantum coherent interactions in semiconductor nano-structure optical gain media operating at room temperature"** *Invited paper*

34. The Conference on Lasers and Electro-Optics, CLEO 2015, **"Quantum Coherent Interactions in Room Temperature InAs/InP Quantum Dot Amplifiers"** - *Invited paper*

35. The 45th Winter Colloquium on the Physics of Quantum Electronics, PQE 2015, **"Coherent Interactions in Electrically Driven Quantum Dot Optical Amplifiers Operating at Room Temperature"** – *Invited paper*

36. The 20th international conference on Magnetism, ICM 2015, **"Time-resolved ferromagnetic resonance in ultrathin perpendicularly magnetized films: efficient nonlinear high order harmonics generation"**

37. The 13th joint conference on magnetism and magnetic material – Intermag 2016, **"Determining the intrinsic damping from time-resolved precession decay measurements in perpendicularly magnetized ultrathin films using an analytical approach"**

38. The 13th joint conference on magnetism and magnetic material, Intermag 2016, **"Harnessing the shallow magnetization energy barrier for efficient nonlinear high harmonics generation in perpendicularly magnetized ultrathin CoFeB**

films"

39. The 13th joint conference on magnetism and magnetic material, Intermag 2016, **"Observation of Rabi nutations in a ferromagnet"**

40. American Physics Society March Meeting, APS March meeting 2016, **"Rabi nutations in a ferromagnetic film"**

41. The International Conference on Microwave Magnetics 2016, IEEE ICMM 2016, **"New approach for extraction of intrinsic Gilbert damping from time-resolved MOKE measurements"**

42. The International Conference on Microwave Magnetics 2016, IEEE ICMM 2016, **"Observation of Rabi nutations in ferromagnets"**

43. The International Conference on Microwave Magnetics 2016, IEEE ICMM 2016, **"Observation of unconstrained "free" spin dynamics in ferromagnetic Metals"**

44. American Physics Society March Meeting, APS March meeting 2017, **"Optical Ferromagnetic Resonance for Detection of the Spin Hall Angle by in Perpendicularly Magnetized Ultrathin thin Films"**

45. IEEE International Magnetics Conference INTERMAG Europe 2017, **"Phase-Resolved Detection of the Spin-orbit Torques by Optical Ferromagnetic Resonance in Ultrathin Perpendicularly Magnetized Films"**

46. SPICE-Workshop on Spin Dynamics in the Dirac Systems 2017, **"Time resolved detection of the spin Hall effect"**

47. Gordon Research Conference (GRC) on Spin Dynamics in Nanostructures 2017- Science and Applications of Spin Textures and Spin Currents, "**Phase resolved measurement of Spin-Orbit Torques"**

48. Magnonics 2017**, "Phase-Resolved Detection of Spin-orbit Torques by Optical FMR in Ultrathin Perpendicularly Magnetized Films"**

49. International Conference on Magnetism, ICM 2018 **"Magnetization Switching in Ferromagnetic Thin Film Induced by Adsorbed Chiral Molecules Realized without Current or External Magnetic Field"**

50. International nanotechnology conference in Israel – NANOIL 2018 **"Sensing spin polarized currents in atomically thin material systems – Improving the sensitivity of the optical ferromagnetic resonance method"**

Journal Papers:

1. A. Capua , L. Rozenfeld, V. Mikhelashvili, G. Eisenstein, M. Kuntz, M. Laemmlin, D. Bimberg, **"Direct correlation between a highly damped modulation response and ultra low relative intensity noise in an InAs/GaAs quantum dot laser"**, Optics Express, Vol. 15, Issue 9, pp. 5388-5393 (2007).

2. A. Capua , L. Rozenfeld, V. Mikhelashvili, G. Eisenstein, M. Kuntz, M. Laemmlin, and D. Bimberg, **"Low noise quantum dot lasers"** picked up by Nature Photonics, Vol. 1, pp. 383 - 383 (2007).

3. A. Capua, V. Mikhelashvili G. Eisenstein , J.P. Reithmaier, A. Somers, A. Forchel M. Calligaro, O. Parillaud, M. Krakowski, **"Direct observation of the coherent spectral hole in the noise spectrum of a saturated InAs/InP quantum dash amplifier operating near 1550 nm"**, Optics Express, Vol. 16, Issue 3, pp. 2141-2146 (2008).

4. C. Meuer, J.Kim, M. Laemmlin, S.Liebich, D. Bimberg A. Capua, G. Eisenstein, **"Static Gain Saturation in Quantum Dot Semiconductor Optical Amplifiers"**, Optics Express, Vol. 16, Issue 11, pp. 8269-8279, (2008).

5. C. Meuer, J. Kim, M. Laemmlin, S. Liebich, D. Bimberg, A. Capua, G. Eisenstein, R. Bonk, T. Vallaitis, J. Leuthold, A. R. Kovsh, I. L. Krestnikov, **"40 GHz small-signal cross-gain modulation in 1.3 μm quantum dot semiconductor optical amplifiers"** Applied physics letters, Vol. 93, Issue 5, 051110, (2008).

6. A. Capua, S. O'Duill, V. Mikhelashvili, G. Eisenstein, J.P. Reithmaier, A. Somers, A. Forchel, **"Cross talk free multi channel processing of 10 Gbit/s data via four wave mixing in a 1550 nm InAs/InP quantum dash amplifier"**, Optics Express, Vol. 16, Issue 23, pp. 19072-19077, (2008).

7. A. Capua, G. Eisenstein, J. P. Reithmaier, **"A nearly instantaneous gain response in quantum dash based optical amplifiers"** Applied physics letters, Vol. 97, Issue 13, 131108 (2010).

   Recognized and republished at the Virtual Journal of Ultrafast Science, Vol. 9, Issue 11 (2010).

8. A. Capua, G. Eisenstein, J. P. Reithmaier, **"Ultrafast cross saturation dynamics in inhomogeneously broadened InAs/InP quantum dash optical amplifiers"** Applied physics letters, Vol. 98, Issue 10, 101108 (2011).

   Recognized and republished at the Virtual Journal of Nanoscale Science & Technology, vol. 23 Issue 11 (2011).

9. A. Capua, A. Saal, O. Karni, G. Eisenstein, J. P. Reithmaier and Kresten Yvind, **"Complex characterization of short-pulse propagation through InAs/InP quantum-dash optical amplifiers: from the quasi-linear to the two-photon-dominated regime"**, Optics Express, Vol. 20, Issue 1, pp. 347-353 (2012).

10. A. Capua, O. Karni, G. Eisenstein, K. Yvind, J. P. Reithmaier, **"Extreme nonlinearities in nanowire InP semiconductor gain media: the two-photon induced laser"**, Optics Express, Vol. 20, Issue 6, pp. 5987-5992 (2012).

11. A. Capua, O. Karni, G. Eisenstein, **"A Finite Difference Time Domain Model for Quantum Dot Lasers and Amplifiers in the Maxwell-Schrödinger Framework"**, IEEE Journal of Selected Topics in Quantum Electronics, **19**, 1900410 (2013).

12. O. Karni, A. Capua, G. Eisenstein, D. Franke, J. Kreissl, H. Kuenzel, D. Arsenijević, H. Schmeckebier, M. Stubenrauch, M. Kleinert, D. Bimberg, C. Gilfert, J. P Reithmaier. **"Nonlinear pulse propagation in a quantum dot laser"**, Optics Express. Vol. **21,** Issue 5, pp. 5715–5736 (2013).

13. A. Marynski, G. Sek, A. Musiał, J. Andrzejewski, J. Misiewicz, C. Gilfert, J. P. Reithmaier, A. Capua, O. Karni, D. Gready, G. Eisenstein, G. Atiya, W. D. Kaplan, S. Kolling, **"Electronic structure, morphology and emission polarization of enhanced symmetry InAs quantum-dot-like structures grown on InP substrates by molecular beam epitaxy"**, Journal of Applied Physics **114,** 094306 (2013).

14. O. Karni, A. Capua, G. Eisenstein, V. Sichkovskyi, V. Ivanov, J. P. Reithmaier, **" Rabi oscillations and self-induced transparency in InAs/InP quantum dot semiconductor optical amplifier operating at room temperature"**, Optics Express, Vol. 21, Issue 22, pp. 26786-26796 (2013).

15. O. Karni, K. J. Kuchar, A. Capua, V. Mikhelashvili, G. Sęk, J. Misiewicz, V. Ivanov, J. P. Reithmaier, G. Eisenstein, **Carrier dynamics in inhomogeneously broadened InAs/AlGaInAs/InP quantum-dot semiconductor optical amplifiers**, Appl. Phys. Lett., **104,** 121104, (2014).

16. A. Capua, O. Karni, G. Eisenstein, J. P. Reithmaier, **"Rabi oscillations in a room-temperature quantum dash semiconductor optical amplifier"** Phys. Rev. B **90,** 045305 (2014). – *Editors' suggestion*
(Preprint http://arxiv.org/abs/1210.6803 , 2012)

17. A. Capua, O. Karni, G. Eisenstein, V. Sichkovskyi, V. Ivanov, J. P. Reithmaier, **"Coherent control in a semiconductor optical amplifier operating at room temperature"**, Nature Comm. **5,** 5025, (2014).

18. G. Eisenstein, O. Karni, A. K. Mishra, A. Capua, D. Gready, V. V. Sichkovskyi, V. Ivanov, J. P. Reithmaier, **"Time-scale-dependent nonlinear dynamics in InAs/InP quantum dot gain media: from high-speed modulation to coherent**

light–matter interactions" , IEEE Photon. J. **7,** 0700407 (2015) – *Invited Review*

19. A.Capua, S. H. Yang, T. Phung, S. S. P. Parkin, **"Determination of intrinsic damping of perpendicularly magnetized ultrathin films from time-resolved precessional magnetization measurements"**, Phys. Rev. B. **92,** 224402 (2015).

20. A. Capua, C. Rettner, S. S. P. Parkin**, "Parametric Harmonic Generation as a Probe of Unconstrained Spin Magnetization Precession in the Shallow Barrier Limit",** Phys. Rev. Lett. **116,** 047204 (2016).

21. O. Ben Dor, S. Yochelis, A. Radko, K. Vankayala, E. Capua, A. Capua, S.H. Yang, L. T. Baczewski, S. Parkin, R. Naaman, Y. Paltiel, **"Induced Magnetization Switching by Local Adsorption of Chiral Molecules on Ferromagnets"**, Nature Comm. **8,** 14567 (2017).

22. A. Capua, T. Wang, S.-H. Yang, C. Rettner, T. Phung, S. S. P. Parkin **"Phase-Resolved Detection of the Spin Hall Angle by Optical Ferromagnetic Resonance in Perpendicularly Magnetized Thin Films",** Phys. Rev. B, **95,** 064401 (2017).

23. A. Capua, C. Rettner, S. H. Yang, T. Phung, S. S. P. Parkin, **"Ensemble-averaged Rabi oscillations in a ferromagnetic CoFeB film"**, Nature Comm. **8,** 16004 (2017).

24. K. Banerjee-Ghosh, O. Ben Dor, F. Tassinari, E. Capua, S. Yochelis, A. Capua, S.-H. Yang, S. S. P. Parkin, S. Sarkar, L. Kronik, L. T. Baczewski, R. Naaman, and Y. Paltiel **"Separation of enantiomers by their enantiospecific interaction with achiral magnetic substrates"**, Science **360,** 1331 (2018).

25. V. Mikhelashvili, G. Atiya, Y. Kauffmann, Y. Shneider, G. Ankonina, G. Zeevi, Y.Yaish, A.Capua, G.Eisenstein, **"Non-volatile memory and negative photoconductivity in a metal-insulator-semiconductor diode with embedded Co nanoparticles"** Journal of App. Physics. **123,** 224506 (2018).

Manuscripts in preparation

1. A. Capua, J. Jeong, Y. Ferrante, and S. S. P. Parkin, **"Magnetization dynamics in CoMn based antiparallel Heusler alloys"**.

2. A. Capua, and S. S. P. Parkin, **"Derivation of the general ferromagnetic resonance from the Lagrangian formalism".**

Patents

1. **Method and system for generating and emitting terahertz radiation**.
   Filed: August 7, 2014. Issued: June 28, 2016. US patent No. 9,377,669