November 2018

Ezio Iacocca

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Dispersive Hydrodynamic Laboratory, Orcid, GoogleScholar

POSITIONS

January 2018 – Present. Instructor / Research associate, CU Boulder

August 2016 – Present. International associate, NIST Boulder

June 2015 – December 2017. Visiting scholar, CU Boulder

January 2015 – December 2017. Postdoc. Chalmers University of Technology, Sweden

September 2014 – December 2014. Assistant Researcher. University of Gothenburg, Sweden

August 2010 – December 2014. Researcher. NanOsc AB, Sweden

EDUCATION

August 2010 – September 2014. Ph.D. in Physics. University of Gothenburg, Sweden

August 2009 – June 2010. M.Sc. in Nanotechnology. Royal Institute of Technology, Sweden

September 2003 – February 2009. B.S. in Electronic Engineering. Simón Bolívar University, Venezuela

FUNDING

2018. *Magnetic hydrodynamic states and spin current transport* (pending). Condensed matter and materials theory, National Science Foundation. $479,000.

2015. *Solitary waves and dispersive hydrodynamics on the nanoscale for next generation storage and logic*. International postdoc grant, Swedish Research Council. 3,500,000 SEK (approx. $400,000).

HONORS AND AWARDS

2015. Faculty of Science prize for best Ph.D. thesis in 2014. University of Gothenburg, Sweden

2014. Finalist for Best Student Presentation Award, $250. IEEE International Magnetics Conference 2014

2011. Travel grant, $1,200. IEEE Magnetic School in New Orleans

2008. Cum-Laude laureate. Simón Bolívar University, Venezuela

PROFESSIONAL ACTIVITIES

- Member of the editorial review board of IEEE Magnetics Letters since 2016
- Member of the American Physical Society and IEEE Magnetics Society
- Reviewer for Nature Publishing Group, American Physical Society, American Institute of Physics, and Elsevier

SERVICE

- Organizer, Front Range advanced magnetic symposium 2019.
- Program Committee, Magnetism and magnetic materials conference 2019

INVITED TALKS (5)

1. **(Scheduled)** *Spin-current-mediated rapid magnon localization and coalescence after ultrafast optical pumping of ferrimagnetic alloys*, Joint Magnetism and Magnetic Materials / IEEE International Magnetics Conference, January 16, 2019. Washington D.C.
2. *Topological excitations in thin film ferromagnets and artificial spin ices*, Magnonics, August 7, 2017. Oxford, UK
3. *Dispersive hydrodynamic formulation of thin film ferromagnets*, Spin coherence, condensation, and superfluidity, February 15, 2017. Moorea, French Polynesia
4. *Dispersive hydrodynamics in ferromagnets*. International Conference on Magnetic Materials, June 8, 2016. Tuscaloosa, AL
5. *Dispersive hydrodynamics in ferromagnets*. Magnetic Linear X-ray Symposium, May 23, 2016. Vail, CO

SEMINARS (9)

1. *Rapid soliton nucleation and dynamics in magnetic materials*, CU Boulder, September 25, 2018
2. *Theory of non-local spin transport with a topological chain of domain walls*, NIST, November 3, 2017
3. *Topological excitations in thin film ferromagnets and artificial spin ices*, University of Glasgow, August 16, 2017. UK
4. *Breaking of Galilean invariance in the hydrodynamic formulation of thin film ferromagnets*, NIST, August 25, 2016
5. *Current-induced waves in thin film ferromagnets*. CU Boulder, November 3, 2015
6. *From dissipative droplets to skyrmions*. Argonne National Lab, August 4, 2015
7. *Micromagnetic simulations of highly non-linear modes in spin torque oscillators: propagating, solitonic and magnetic dissipative droplet modes*. Argonne National Lab, January 10, 2013

8. *Current-induced dynamics in magnetic thin films: GPU accelerated micromagnetic simulations of non-linear spin wave modes*. SPINTEC, December 4, 2012. France
9. *Mutual locking of spin torque oscillators: towards array synchronization*. Royal Institute of Technology, December 8, 2010. Sweden

MANUSCRIPT PREPRINTS / IN PREPARATION (3)

1. **E. Iacocca**, T-M. Liu, A. H. Reid, Z. Fu, S. Ruta, P. W. Granitzka, E. Jal, S. Bonetti, A. X. Gray, C. E. Graves, R. Kukreja, Z. Chen, D. J. Higley, T. Chase, L. Le Guyader, K. Hirsch, H. Ohldag, W. F. Schlotter, G. L. Dakovski, G. Coslovich, M. C. Hoffmann, S. Carron, A. Tsukamoto, A. Kirilyuk, A. V. Kimel, Th. Rasing, J. Stöhr, R. F. L. Evans, T. Ostler, R. W. Chantrell, M. A. Hoefer, T. J. Silva, and H. A. Dürr, *Spin-current-mediated rapid magnon localization and coalescence after ultrafast optical pumping of ferrimagnetic alloys*, arXiv:1809.02076 (2018). In review for Nature Communications
2. P. Sprenger, M. A. Hoefer, and **E. Iacocca**, *Magnonic band structure established by chiral spin-density waves in thin film ferromagnets*, in preparation for IEEE Magnetic Letters
3. **E. Iacocca**, T. J. Silva, and M. A. Hoefer, *Perspectives of spin hydrodynamics*, in preparation for Physics Letters A (2018)

PUBLICATIONS (35)

1. M. Ruth, **E. Iacocca**, P. G. Kevrekidis, and M. A. Hoefer, *Transverse instabilities of stripe domains in magnetic thin films with perpendicular magnetic anisotropy*, Phys. Rev. B **97**, 104428 (2018)
2. **E. Iacocca**, T. J. Silva, and M. A. Hoefer, *Symmetry-broken dissipative exchange flows in thin film ferromagnets with in-plane anisotropy*, Phys. Rev. B **96**, 134434 (2017)
3. R. Sharma, N. Sisodia, **E. Iacocca**, A. A. Awad, J. Åkerman, and P. K. Muduli, *A high-speed single sideband generator using a magnetic tunnel junction spin-torque nano-oscillator*, Sci. Rep. **7**, 13422 (2017)
4. **E. Iacocca** and O. Heinonen, *Topologically non-trivial modes in artificial square spin ices subject to Dzyaloshinskii-Moriya interaction*, Phys. Rev. Appl. **8**, 034015 (2017)
5. S. Zhang, **E. Iacocca**, and O. Heinonen, *Tunable mode coupling in nanocontact spin-torque oscillators*, Phys. Rev. Appl. **8**, 014034 (2017)
6. **E. Iacocca** and M. A. Hoefer, *Vortex-antivortex proliferation from an obstacle in thin film ferromagnets*, Phys. Rev. B **95**, 134409 (2017) (Editor's suggestion)
7. **E. Iacocca**, T. J. Silva, and M. A. Hoefer, *Breaking of Galilean invariance in the hydrodynamic formulation of thin film ferromagnets*, Phys. Rev. Lett. **118**, 017203 (2017)

8. A. A. Awad, P. Dürrenfeld, A. Houshang, M. Dvornik, **E. Iacocca**, R. K. Dumas, and J. Åkerman, *Long range mutual synchronization of spin Hall nano-oscillators*, Nature Physics **13**, 292 (2017)
9. M. Fazlali, M. Dvornik, **E. Iacocca**, P. Dürrenfeld, M. Haidar, J. Åkerman, and R. K. Dumas, *Homodyne-detected ferromagnetic resonance of in-plane magnetized nano-contacts: Composite spin-wave resonances and their excitation mechanism*, Phys. Rev. B **93**, 134427 (2016)
10. **E. Iacocca**, S. Gliga, R. L. Stamps, and O. Heinonen, *Reconfigurable wave band structure of an artificial square ice*, Phys. Rev. B **93**, 134420 (2016)
11. S. Chung, A. Eklund, **E. Iacocca**, S. M. Mohseni, S. R. Sani, L. Bookman, M. A. Hoefer, R. K. Dumas, and J. Åkerman, *Magnetic droplet nucleation boundary in orthogonal spin-torque nano-oscillators*, Nature Comm. **7**, 11209 (2016)
12. P. Wills, **E. Iacocca**, and M. A. Hoefer, *Deterministic drift instability and stochastic thermal perturbations of magnetic dissipative droplet solitons*, Phys. Rev. B **93**, 144408 (2016)
13. M. B. Jungfleisch, W. Zhang, **E. Iacocca**, J. Sklenar, J. Ding, W. Jiang, J. E. Pearson, J. B. Ketterson, O. Heinonen, and A. Hoffmann, *Dynamic response of an artificial square spin ice*, Phys. Rev. B **93**, 100401(R) (2016)
14. A. Houshang, **E. Iacocca**, P. Dürrenfeld, J. Åkerman, and R. K. Dumas, *Spin-wave-beam mediated mutual synchronization of nanocontact spin-torque oscillators*, Nature Nanotechnol. **11**, 280 (2016)
15. Y. Zhou, **E. Iacocca**, A. A. Awad, R. K. Dumas, F. C. Zhang, H. B. Braun, and J. Åkerman, *Dynamically stabilized magnetic skyrmions*, Nature Comm. **6**, 8193 (2015)
16. M. Madami, **E. Iacocca**, S. R. Sani, G. Gubbiotti, S. Tacchi, R. K. Dumas, J. Åkerman, and G. Carlotti, *Propagating spin waves excited by spin-transfer-torque: A combined electrical and optical study*, Phys. Rev. B **92**, 024403 (2015)
17. **E. Iacocca**, P. Dürrenfeld, O. Heinonen, J. Åkerman, and R. K. Dumas. *Mode-coupling mechanisms in nanocontact spin-torque oscillators*, Phys. Rev. B **91**, 104405 (2015)
18. T. Chen, A. Eklund, **E. Iacocca**, S. Rodriguez, G. Malm, J. Åkerman, and A. Rusu, *Comprehensive and macrospin-based magnetic tunnel junction spin torque oscillator model – Part I: Analytical model of the MTJ STO*, IEEE T. Electron. Dev. **62**, 1045 (2015)
19. T. Chen, A. Eklund, **E. Iacocca**, S. Rodriguez, G. Malm, J. Åkerman, and A. Rusu, *Comprehensive and macrospin-based magnetic tunnel junction spin torque oscillator model – Part II: Verilog-A model implementation*, IEEE T. Electron. Dev. **62**, 1037 (2015)
20. P. Dürrenfeld, **E. Iacocca**, J. Åkerman, and P. K. Muduli, *Modulation-mediated unlocking of a parametrically phase-locked spin torque oscillator*, Appl. Phys. Lett. **105**, 252404 (2014)
21. M. Ranjbar, P. Dürrenfeld, M. Haidar, **E. Iacocca**, M. Balinskiy, T. Q. Le, M. Fazlali, A. Houshang, A. A. Awad, R. K. Dumas, and J. Åkerman, *CoFeB-based spin Hall nano-oscillators*, IEEE Magn. Lett. **5**, 3000504 (2014)

22. A. Houshang, S. R. Sani, P. Dürrenfeld, **E. Iacocca**, J. Åkerman, and R. K. Dumas, *Effect of excitation fatigue on the synchronization of multiple nanocontact spin-torque oscillators*, IEEE Magn. Lett. **5**, 3000404 (2014)
23. R. Sharma, P. Dürrenfeld, **E. Iacocca**, O. Heinonen, J. Åkerman, and P. K. Muduli, *Mode-hopping mechanism generating colored noise in a magnetic tunnel junction based spin torque oscillator*, Appl. Phys. Lett. **105**, 132404 (2014)
24. **E. Iacocca**, R. K. Dumas, L. Bookman, S. M. Mohseni, S. Chung, M. A. Hoefer, and J. Åkerman, *Confined dissipative droplet solitons in spin-valve nanowires with perpendicular magnetic anisotropy*, Phys. Rev. Lett. **112**, 047201 (2014)
25. **E. Iacocca**, O. Heinonen, P. K. Muduli, and J. Åkerman, *Generation linewidth of mode-hopping spin torque oscillators*, Phys. Rev. B **89**, 054402 (2014)
26. A. Eklund, S. Bonetti, S. R. Sani, S. M. Mohseni, J. Persson, S. Chung, A. Banuazizi, **E. Iacocca**, M. Östling, J. Åkerman, and G. Malm, *Dependence of the colored frequency noise in spin torque oscillators on current and magnetic field*, Appl. Phys. Lett. **104**, 092405 (2014)
27. P. Dürrenfeld, **E. Iacocca**, J. Åkerman, and P. K. Muduli, *Parametric excitation in a magnetic tunnel junction-based spin torque oscillator*, Appl. Phys. Lett. **104**, 052410 (2014)
28. S. M. Mohseni, S. R. Sani, R. K. Dumas, J. Persson, T. N. Anh Nguyen, S. Chung, Ye. Pogoryelov, P. K. Muduli, **E. Iacocca**, A. Eklund, and J. Åkerman, *Magnetic droplet solitons in orthogonal nano-contact spin torque oscillators*, Physica B **435**, 84 (2014)
29. **E. Iacocca** and J. Åkerman, *Resonant excitation of injection-locked spin-torque oscillators*, Phys. Rev. B **87**, 214428 (2013)
30. R. K. Dumas, **E. Iacocca**, S. Bonetti, S. R. Sani, S. M. Mohseni, A. Eklund, J. Persson, O. Heinonen, and J. Åkerman, *Spin-wave-mode coexistence on the nano-scale: A consequence of the Oersted-field-induced asymmetric energy landscape*, Phys. Rev. Lett. **110**, 257202 (2013)
31. S. M. Mohseni, S. R. Sani, J. Persson, T. N. Ahn Nguyen, S. Chung, Ye. Pogoryelov, P. K. Muduli, **E. Iacocca**, A. Eklund, R. K. Dumas, S. Bonetti, A. Deac, M. A. Hoefer, and J. Åkerman, *Spin torque-generated magnetic droplet solitons*, Science **339**, 1295 (2013)
32. **E. Iacocca** and J. Åkerman, *Analytical investigation of modulated spin-torque oscillators in the framework of coupled differential equations with variable coefficients*, Phys. Rev. B **85**, 184420 (2012)
33. **E. Iacocca** and J. Åkerman, *Destabilization of serially connected spin-torque oscillators via non-Adlerian dynamics*, J. Appl. Phys. **110**, 103910 (2011) (Selected for publication in the Virtual Journal of Nanoscale Science & Technology, December 12, 2011)
34. Ye. Pogoryelov, P. K. Muduli, S. Bonetti, **E. Iacocca**, F. Mancoff, and J. Åkerman, *Frequency modulation of spin torque oscillator pairs*, Appl. Phys. Lett. **98**, 192501 (2011)
35. Y. Zhou, V. Tiberkevich, G. Consolo, **E. Iacocca**, B. Azzerboni, A. Slavin, and J. Åkerman, *Oscillatory transient regime in the forced dynamics of a nonlinear auto oscillator*, Phys. Rev. B **82**, 012408 (2010)

REVIEW ARTICLES (3)

1. R. K. Dumas, S. R. Sani, S. M. Mohseni, **E. Iacocca**, Ye. Pogoryelov, P. K. Muduli, S. Chung, P. Dürrenfeld, and J. Åkerman, *Recent advances in nanocontact spin-torque oscillators*, IEEE Trans. Magn. **50**, 1 (2014)
2. S. Chung, S. M. Mohseni, S. R. Sani, **E. Iacocca**, R. K. Dumas, T. N. Ahn Nguyen, Ye. Pogoryelov, P. K. Muduli, A. Eklund, M. A. Hoefer, and J. Åkerman, *Spin transfer torque generated magnetic droplet solitons*. J. Appl. Phys. **115**, 172612 (2014)
3. O. Heinonen, P. K. Muduli, **E. Iacocca**, and J. Åkerman. *Decoherence, mode hopping, and mode coupling in spin torque oscillators*, IEEE Trans. Magn. **49**, 4398 (2013)

TEACHING

CU Boulder

- Differential equations and linear algebra, APPM 2360. Spring 2018
- Co-instructor of Scientific Computing in MATLAB, APPM 3050. Spring 2017

Simón Bolívar University

- TA of analog electronics. Fall 2008
- TA of microelectronic circuits. Fall 2007

MENTORING

CU Boulder

- July 2018 – Present: Mingyu Hu (graduate student)
- January 2018 – Present: Patrick Sprenger (graduate student)
- June 2016 – August 2018: Maximilian Ruth (undergraduate student). Phys. Rev. B **97**, 104428 (2018)
- July 2015 – April 2016: Peter Wills (graduate student) Phys. Rev. B **93**, 144408 (2016)

University of Gothenburg

- 2012 – 2014: Afshin Houshang (graduate student) Nature Nanotechnol. **11**, 280 (2016); IEEE Magn. Lett. **5**, 3000404 (2014)