



Dr. Roman VERBA

Senior researcher

Department of physics of mezo- and nanocrystalline magnetic structures

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Education

2010 – 2014 **Ph.D.** in *Physics and Mathematics*, (specialty 01.04.03 - radiophysics), Faculty of Radiophysics, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

Ph.D. thesis: “*Microwave properties of artificial magnonic crystals based on arrays of magnetic nanoelements*”.

2004 – 2010 **Master** in *Radiophysics and Electronics*, Faculty of Radiophysics, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

Professional Experience

2017 – pres. **Senior researcher**, Institute of Magnetism, Kyiv, Ukraine

2016 – 2017 **Researcher**, Institute of Magnetism, Kyiv, Ukraine

2013 – 2016 **Junior researcher**, Institute of Magnetism, Kyiv, Ukraine

International collaboration, internships

2011 – 2017 Oakland University (USA)

2012 University of the Basque Country (Spain)

2015, 2017 University of Porto (Portugal)

2018 Technical University of Kaiserslautern (Germany)

Research interests

Analytical theory, numerical and micromagnetic simulations in:

- spin waves, magnonics
- microwave magnetization dynamics, spin waves
- magnetic nanostructures
- spin-torque oscillators
- voltage-controlled magnetic anisotropy

Awards, grants, projects

2018 Grant of President of Ukraine for young scientists, title “*Nonlinear spin-wave processes in ferromagnetic nanostructures with interfacial Dzyaloshinskii-Moriya interaction*”

2015 – 2017 PI of the project 0115U002716 “*Effect of electric and magnetic fields on microwave properties and morphology of magnetic nanostructures*”, funded by Ministry of Education and Science of Ukraine

2016 – 2018 Scholarship of President of Ukraine for young scientist

2009, 2010 Fellowship of Zavtra.UA scholarship program for talented students by the Victor Pinchuk foundation.

Publications

Book chapters

1. R. Verba, G. Melkov, V. Tiberkevich, A. Slavin, Chapter 5 - Linear magnetization dynamics in an array of dipolarly coupled magnetic nanodots // In: Handbook of Surface Science, volume 5, ed. by R.E. Camley, Z. Celinski, R.L. Stamps (North-Holland, 2016), - P. 215-241.
2. R. Verba, M. Carpentieri, G. Finocchio, V. Tiberkevich, A. Slavin, Chapter 13 - Parametric excitation and amplification of spin waves in ultrathin ferromagnetic nanowires by microwave electric field // In: Spin wave confinement: Propagating waves (2nd edition), ed. by S. O. Demokritov (Pan Stanford Publishing Pte. Ltd., Singapore, 2017), - P. 385-426.

Articles in scientific journals

2018

- Q. Wang, P. Pirro, R. Verba, A. Slavin, B. Hillebrands, A. V. Chumak, Reconfigurable nanoscale spin-wave directional coupler, *Sci. Adv.* **4**, e1701517 (2018).
- R. Verba, M. Carpentieri, G. Finocchio, V. Tiberkevich, A. Slavin, Amplification and stabilization of large-amplitude propagating spin waves by parametric pumping, *Appl. Phys. Lett.* **112**, 042402 (2018).
- R. Zivieri, A. Giordano, R. Verba, B. Azzerboni, M. Carpentieri, A. N. Slavin, G. Finocchio, Theory of nonreciprocal spin-wave excitations in spin Hall oscillators with Dzyaloshinskii-Moriya interaction, *Phys. Rev. B* **97**, 134416 (2018).
- R. Verba, I. Lisenkov, I. Krivorotov, V. Tiberkevich, A. Slavin, Nonreciprocal Surface Acoustic Waves in Multilayers with Magnetoelastic and Interfacial Dzyaloshinskii-Moriya Interactions, *Phys. Rev. Applied* **9**, 064014 (2018).

2017

- R. Verba, M. Carpentieri, G. Finocchio, V. Tiberkevich, A. Slavin, Excitation of spin waves in an in-plane-magnetized ferromagnetic nanowire using voltage-controlled magnetic anisotropy, *Phys. Rev. Appl.* **7**, 064023 (2017).
- Y.-J. Chen, H. K. Lee, R. Verba, J. A. Katine, I. Barsukov, V. Tiberkevich, J. Q. Xiao, A. N. Slavin, I. N. Krivorotov, Parametric resonance of magnetization excited by electric field, *Nano Lett.* **17**, 572 (2017).

2016

- R. Verba, E. Bankowski, T. Meitzler, V. Tiberkevich, A. Slavin, Nonreciprocal spin waves in a magnonic crystal with in-plane static magnetization, *SPIN* **6**, 1640013 (2016).
- A. Giordano, R. Verba, R. Zivieri, A. Laudani, V. Puliafito, G. Gubbiotti, R. Tomasello, G. Siracusano, B. Azzerboni, M. Carpentieri, A. Slavin, G. Finocchio, Spin-Hall nano-oscillator with oblique magnetization and Dzyaloshinskii-Moriya interaction as generator of skyrmions and nonreciprocal spin-waves, *Sci. Rep.* **6**, 36020 (2016).

- R. V. Verba, A. Hierro-Rodriguez, D. Navas, J. Ding, X. M. Liu, A. O. Adeyeye, K. Y. Guslienko, G. N. Kakazei, Spin-wave excitation modes in thick vortex-state circular ferromagnetic nanodots, *Phys.Rev. B* **93**, 214437 (2016).
- R. Verba, M. Carpentieri, G. Finocchio, V. Tiberkevich, A. Slavin, Excitation of propagating spin waves in ferromagnetic nanowires by microwave voltage-controlled magnetic anisotropy, *Sci. Rep.* **6**, 25018 (2016).

2015

- G. N. Kakazei, X. M. Liu, J. Ding, V. O. Golub, O. Y. Salyuk, R. V. Verba, S. A. Bunyaev, A. O. Adeyeye, Large four-fold magnetic anisotropy in two-dimensional modulated Ni₈₀Fe₂₀ films, *Appl. Phys. Lett.* **107**, 232402 (2015).
- L. Yang, R. Verba, V. Tiberkevich, T. Schneider, A. Smith, Z. Duan, B. Youngblood, K. Lenz, J. Lindner, A. N. Slavin, I. N. Krivorotov, Reduction of phase noise in nanowire spin orbit torque oscillators, *Sci. Rep.* **5**, 16942 (2015).
- R. Verba, V. Tiberkevich, A. Slavin, Influence of interfacial Dzyaloshinskii-Moriya interaction on the parametric amplification of spin waves, *Appl. Phys. Lett.* **107**, (2015).
- M. Stebliy, A. Ognev, A. Samardak, L. Chebotkevich, R. Verba, G. Melkov, V. Tiberkevich, A. Slavin, Influence of the properties of soft collective spin wave modes on the magnetization reversal in finite arrays of dipolarly coupled magnetic dots, *J. Magn. Magn. Mater.* **384**, 166 (2015).

2014

- R. Verba, V. Tiberkevich, I. Krivorotov, A. Slavin, Parametric excitation of spin waves by voltage-controlled magnetic anisotropy, *Phys. Rev. Appl.* **1**, 044006 (2014).

2013

- Verba R., Microwave properties of hexagonal arrays of magnetic nano-dots, *Bulletin of Taras Shevchenko National University of Kyiv. Padiophysics and electronics* **17**, 29 (2013).
- R. Verba, V. Tiberkevich, K. Guslienko, G. Melkov, A. Slavin, Theory of ground-state switching in an array of magnetic nanodots by application of a short external magnetic field pulse, *Phys. Rev. B.* **87**, 134419 (2013).
- R. V. Verba, Spin waves in arrays of magnetic nanodots with magnetodipolar coupling, *Ukrainian J. Phys.* **58**, 758 (2013).
- R. Verba, V. Tiberkevich, E. Bankowski, T. Meitzler, G. Melkov, A. Slavin, Conditions for the spin wave nonreciprocity in an array of dipolarly coupled magnetic nanopillars, *Appl. Phys. Lett.* **103**, 082407 (2013).
- R. Verba, V. Tiberkevich, E. Bankowski, T. Meitzler, G. Melkov, A. Slavin, Localized defect modes in a two-dimensional array of magnetic nanodots, *IEEE Magn. Lett.* **4**, 4000404 (2013).

2012

- R. Verba, G. Melkov, V. Tiberkevich, A. Slavin, Collective spin-wave excitations in a two-dimensional array of coupled magnetic nanodots, *Phys. Rev. B.* **85**, 014427 (2012).
- R. Verba, G. Melkov, V. Tiberkevich, A. Slavin, Fast switching of a ground state of a reconfigurable array of magnetic nano-dots, *Appl. Phys. Lett.* **100**, 192412 (2012).

2010

- Prokopenko O., Verba R., Influence of signal time delay on magnetization dynamics of two coupled spin-torque nano-oscillators, Bulletin of Taras Shevchenko National University of Kyiv. Padiophysics and electronics **14**, 31 (2010).

2009

- Prokopenko O., Verba R., Broad-band regime of forced phase-locking of magnetization oscillations in spin-torque nanooscillators, Bulletin of Taras Shevchenko National University of Kyiv. Padiophysics and electronics **12**, 36 (2009).

Invited conference talks

- R. V. Verba, V. S. Tiberkevich, A. N. Slavin, Voltage control of spin waves in ultra-thin ferromagnetic waveguides, INTERMAG 2014 (Dresden, Germany, 4 - 8 May 2014).
- R. Verba, L. Yang, V. Tiberkevich, T. Schneider, A. Smith, Z. Duan, B. Youngblood, K. Lenz, J. Lindner, A. Slavin, I. Krivorotov, Effect of dipolar interaction and bias nonuniformity on nanowire spin-Hall oscillator dynamics, Baltic Spin 2016 (Jurmala, Latvia, 9-13 August 2016).
- R. Verba, A. Hierro-Rodriguez, D. Navas, J. Ding, X. Liu, A. Adeyeye, K. Guslienko, G. Kakazei Spin-wave excitation modes in thick vortex-state magnetic nanodots, Baltic Spin 2016 (Jurmala, Latvia, 9-13 August 2016).