

# DR. IR. REINOUD LAVRIJSEN

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## LIST OF PUBLICATIONS, PRESENTATIONS, SUPERVISED STUDENTS (AS PER JANUARY 2018)

### FIRST-AUTHOR / LAST-AUTHOR

1. [Scanning electron microscopy with polarization analysis for multi-layered chiral spin textures](#)  
J. Lucassen, F. Kloodt-Twesten, R. Frompter, H.P. Oepen, R.A. Duine, H. J. M. Swagten, B. Koopmans, R. Lavrijsen  
*Applied Physics Letters* **111**, 132403, (2017)
2. [Periodically modulated ferromagnetic waveguide claddings with perpendicular magnetic anisotropy for enhanced mode conversion](#),  
Y.L.W. van Hees, J.J.G.M. van der Tol, B. Koopmans, R. Lavrijsen,  
*Accepted at IEEE Photonics* (2017)
3. [Asymmetric magnetic bubble expansion under in-plane field in Pt/Co/Pt: Effect of interface engineering](#)  
R. Lavrijsen, D.M.F. Harmann, A. van den Brink, Y. Yin, M. Verheijen, B. Barcones, R.A. Duine, H. J. M. Swagten, B. Koopmans  
*Phys. Rev. B* **91**, 104414 (2015)
4. [Multi-bit operations in vertical spintronic shift registers](#)  
R. Lavrijsen, J-H. Lee, A. Fernandez-Pacheco, D. Petit, R. Mansell, R.P. Cowburn  
*Nanotechnology* **25**, 105201, (2014)
5. [Magnetic ratchet for 3-dimensional spintronics memory and logic](#)  
R. Lavrijsen, J-H. Lee, A. Fernandez-Pacheco, D. Petit, R. Mansell, R.P. Cowburn  
*Nature* **494**, 647-650, (2013)
6. [Asymmetric Pt/Co/Pt-stack induced sign-control of current-induced magnetic domain-wall creep](#)  
R. Lavrijsen, P.P.J. Haazen, E. Mure, J.H. Franken, J.T. Kohlhepp, H.J.M. Swagten and B. Koopmans  
*Applied Physics Letters*, **100**, 262408, (2012)
7. [Tuning the RKKY-interlayer exchange coupling between single perpendicularly magnetized CoFeB layers](#)  
R. Lavrijsen, A. Fernandez-Pacheco, D. Petit, R. Mansell, J.H. Lee, R.P. Cowburn  
*Applied Physics Letters*, **100**, 052411, (2012)
8. [Magnetism in  \$\text{Co}\_{80-x}\text{Fe}\_x\text{B}\_{20}\$ ; effect of crystallization](#)  
R. Lavrijsen, P.V. Paluskar, C.T.J. Loermans, P.A. van Kruisbergen, J.T. Kohlhepp, H.J.M. Swagten and B. Koopmans.  
*Journal of Applied Physics*, **109**, 093905, (2011)
9. [Enhanced -field driven domain-wall motion in Pt/Co<sub>68</sub>B<sub>32</sub>/Pt strips](#)  
R. Lavrijsen, J.T. Kohlhepp, H.J.M. Swagten and B. Koopmans.  
*Applied Physics Letters*, **98**, 132502, (2011)
10. [Fe:O:C grown by focused-electron-beam-induced deposition: magnetic and electric properties](#)  
R. Lavrijsen, R. Cordoba, F. J. Schoenaker, T. Ellis, B. Barcones-Campo, J.T.

Kohlhepp, H.J.M. Swagten, B. Koopmans, J.M. De Teresa, C. Magen, M.R. Ibarra, P. Trompenaars and J.J.L. Mulders.  
*Nanotechnology*, **22**, 025302, (2011).

11. [Controlled domain wall injection in perpendicularly magnetized strips](#)  
R. Lavrijsen, J.H. Franken, J. T. Kohlhepp, H. J. M. Swagten, B. Koopmans  
*Applied Physics Letters* **96**, 222502, (2010)
12. [Reduced domain wall pinning in ultrathin Pt/Co<sub>100-x</sub>B<sub>x</sub>/Pt with perpendicular magnetic anisotropy](#)  
R. Lavrijsen, G.Malinowski, J.H. Franken, J. T. Kohlhepp, H. J. M. Swagten, B. Koopmans, M. Czapkiewicz, T. Stobiecki  
*Applied Physics Letters* **96**, 022501, (2010)

#### CO-AUTHOR

13. [Sputter grown Fe and Cr/Fe multilayers with fourfold magnetic anisotropy on GaAs](#),  
R.H. Mansell, D.C.M.C. Petit, A. Fernandez-Pacheco, R. Lavrijsen, J.H. Lee, R.P. Cowburn  
*IEEE transactions on magnetics*, **54** 2000105 (2018)
14. [Synthesis of Ni Nanoparticles with Controllable Magnetic Properties by Atmospheric Pressure Microplasma Assisted Process](#), L. Liu, S. Li, S.A. Starostin, R. lavrijsen, W. Wang, V. Hessel  
*American Society of Chemical Engineers (AIChE)* (2017)
15. [Deterministic all-optical switching of synthetic ferrimagnets using single femtosecond laser pulses](#)  
M.L.M. Lalieu, M.J.G. Peeters, S.R.R. Haenen, R. Lavrijsen, B. Koopmans  
*Physical Review B*, **96**, 220411 (2017)
16. [The Electrochemistry of Iron Oxide Thin Films Nanostructured by High Ion Flux Plasma Exposure](#)  
R. Sinha, I. Tanyeli, R. Lavrijsen, R. van der Sanden, A. Bieberle  
*Electrochimica Acta*, **258** 709-717 (2017)
17. [Thickness dependence of unidirectional spin-Hall magnetoresistance in metallic bilayers](#)  
Y.Yin, D.-S. Han, M.C.H. de Jong, R. Lavrijsen, R.A. Duine, H.J.M. Swagten, Bert Koopmans,  
*Applied Physics Letters*, **111**, 232405 (2017)
18. [Fabrication, Detection, and Operation of a Three-Dimensional Nanomagnetic Conduit](#),  
D. Sanz-Hernández, R.F. Hamans, J.-W. Liao, A. Welbourne, R. Lavrijsen, and Amalio Fernández-Pacheco  
*ACS Nano* (2017)
19. [Visible-light-promoted gas-phase water splitting using porous WO<sub>3</sub>/BiVO<sub>4</sub> photoanodes](#)  
T. Stoll, G. Zafeiropoulos, I. Dogan, H. Genuit, R. Lavrijsen, B. Koopmans, M.N. Tsampas  
*Electrochemistry Communications* **82**, 47-51, (2017)

20. [Nanostructuring of iron thin films by high flux low energy helium plasma](#)  
A. Bieberle-Hutter, I. Tanyeli, R. Lavrijsen, B. Koopmans, R. Sinha, M.C.M. van de Sanden  
*Thin Solid Films* **631**, 50-56, (2017)
21. [Vector magnetometry of Fe/Cr/Fe trilayers with biquadratic coupling](#)  
R. Mansell, D.C.M.C. Petit, A. Fernandez-Pacheco, J.H. Lee, S.L. Chin, R. Lavrijsen, R.P. Cowburn  
*Journal of Physics D-Applied Physics* **50**, 19LT02, (2017)
22. [Chiral Magnetoresistance in Pt/Co/Pt zigzag wires](#)  
Y. Yin, D-S. Han, J-S. Kim, R. Lavrijsen, K-J. Lee, S-W. Lee, K-W. Kim, H-W. Lee, H.J.M. Swagten, B. Koopmans  
*Applied Physics Letters* **110**, 122401, (2017)
23. [Zigzag Domain Wall Mediated Reversal in Antiferromagnetically Coupled Layers](#)  
R. Mansell, A. Fernandez-Pacheco, D.C.M.C. Petit, N.J. Steinke, J.H. Lee, R. Lavrijsen, R.P. Cowburn  
*IEEE Magnetics Letters* **8**, 4102304, (2017)
24. [Systematic layer-by-layer characterisation of multilayers for three-dimensional data storage and logic](#)  
D. Petit, R. Lavrijsen, J. H. Lee, R. Mansell, A. Fernandez-Pacheco, R. P. Cowburn  
*Nanotechnology* **27**, 155203, (2016)
25. [Thickness dependence of the interfacial Dzyaloshinskii-Moriya interaction in inversion symmetry broken systems](#)  
J. Cho, N-H. Kim, S. Lee, J-S. Kim, R. Lavrijsen, A. Solignac, Y. Yin, D-S. Han, N. J. J. van Hoof, H. J. M. Swagten, B. Koopmans, C-Y. You  
*Nature Communications* **6**, 7635, (2015)
26. [A robust soliton ratchet using combined antiferromagnetic and ferromagnetic interlayer couplings](#)  
R. Mansell, R. Lavrijsen, A. Fernandez-Pacheco, D. C. M. C. Petit, J. H. Lee, B. Koopmans, H. J. M. Swagten, R. P. Cowburn  
*Applied Physics Letters* **106**, 092404, (2015)
27. [Magnetic properties and interlayer coupling of epitaxial Co/Cu films on Si](#)  
R. Mansell, D. Petit, A. Fernandez-Pacheco, R. Lavrijsen, J.H. Lee, R. P. Cowburn  
*Journal of Applied Physics*, **116**, 063906, (2014)
28. [Soliton propagation in micron-sized magnetic ratchet elements](#)  
J.-H. Lee, D. Petit, R. Lavrijsen, A. Fernandez-Pacheco, R. Mansell, R.P. Cowburn  
*Applied Physics Letters*, **104**, 232404, (2014)
29. [Beam-Induced Fe Nanopillars as Tunable Domain-Wall pinning Sites](#)  
J.H. Franken, M.A.J. van der Heijden, T.H. Ellis, R. Lavrijsen, C. Daniels, D. McGrouther, H.J.M. Swagten, B. Koopmans  
*Advanced Functional Materials* **24**, 23, 3508-3514, (2014)
30. [Domain Imaging during soliton propagation in a 3D magnetic ratchet](#)  
J.-H. Lee, R. Mansell, D. Petit, A. Fernandez-Pacheco, R. Lavrijsen, R. P. Cowburn  
*SPIN*, Vol 3, No. 4, 134001, (2013)
31. [Domain wall depinning governed by the spin Hall effect](#)  
P.P.J. Haazen, E. Mure, J.H. Franken, R. Lavrijsen, H.J.M. Swagten, B. Koopmans  
*Nature Materials* **12**, 299-303, (2013)
32. [Magnetic states in low-pinning high-anisotropy magnetic nanostructures suitable for dynamic imaging](#)  
F. Buttner, C. Moutafis, A. Bisig, P. Wohlhuter, C.M. Gunther, J. Mohanty, J.

- Guilhufe, M. Schneider, C.V. Schmising, S. Schaffert, B. Pfau, M. Hantschmann, M. Riemeier, M. Emmel, S. Finizio, G. Jakob, M. Weigand, J. Rhensius, J.H. Franken, R. Lavrijsen, H.J.M Swagten, H. Stoll, S. Eisebitt, M. Klaui  
*Physical Review B*, **87**, 134422, (2013)
33. [Controllable nucleation and propagation of topological magnetic solitons in CoFeB/Ru ferrimagnetic superlattices](#)  
A. Fernandez-Pacheco, D. Petit, R. Mansell, R. Lavrijsen, J.H. Lee, R.P. Cowburn  
*Physical Review B*, **86**, 104422, (2012)
34. [Giant anomalous Hall effect in Fe-based microwires grown by focused-electron-beam-induced deposition](#)  
R. Cordoba, R. Lavrijsen, A. Fernandez-Pacheco, M.R. Ibarra, F. J. Schoenaker, T. Ellis, B. Barcones-Campo, J.T. Kohlhepp, H.J.M. Swagten, B. Koopmans, J.J.L. Mulders and J.M. De Teresa  
*Journal of Physics D: Applied Physics*. **45**, 035001, (2012)
35. [Domain-Wall pinning by local control of anisotropy in Pt/Co/Pt strips](#)  
J.H. Franken, M. Hoeijmakers, R. Lavrijsen, H.J.M. Swagten  
*Journal of Physics: Condensed matter*, **24**, 024216, (2012)
36. [Precise control of domain wall injection and pinning using helium and gallium focused ion beams](#)  
J.H. Franken, M. Hoeijmakers, R. Lavrijsen, J. T. Kohlhepp, H. J. M. Swagten, B. Koopmans  
*Journal of Applied Physics*, **109**, 07D504, (2011)
37. [Tunable magnetic domain wall oscillator at an anisotropy boundary](#)  
J.H. Franken, R. Lavrijsen, J. T. Kohlhepp, H. J. M. Swagten, B. Koopmans  
*Applied Physics Letters*, **98**, 102512, (2011)
38. [Spin motive forces due to magnetic vortices and domain walls](#)  
M.E. Lucassen, G.C.F.L. Kruis, R. Lavrijsen, H.J.M. Swagten, B. Koopmans and R.A. Duine  
*Physical Review B*, **84**, 014414 (2011)
39. [Correlation between Magnetism and Spin-Dependent Transport in CoFeB Alloys](#)  
P.V. Paluskar, R. Lavrijsen, M. Sicot, J. T. Kohlhepp, H.J.M. Swagten, and B. Koopmans  
*Physical Review Letters* **102**, 016602 (2009)
40. [Magnetization Dynamics and Gilbert damping in ultrathin  \$\text{Co}\_{48}\text{Fe}\_{32}\text{B}\_{20}\$  films with out-of-plane anisotropy](#)  
G. Malinowski, K.C. Kuiper, R. Lavrijsen, H.J.M. Swagten, B. Koopmans  
*Applied Physics Letters* **94**, 102501 (2009)
41. [Tunneling spin polarization and annealing of  \$\text{Co}\_{72}\text{Fe}\_8\text{B}\_{20}\$](#)   
H.J.M. Swagten, P.V. Paluskar, R. Lavrijsen, J.T. Kohlhepp, B. Koopmans  
*Journal of Magnetism and Magnetic Materials* **310** (2, Pt. 3), 2012-2014 (2007)

## ACCEPTED

1. [Versatile microfluidic flow generated by moulded magnetic artificial cilia](#), S. Zhang, Y. Wang, R. Lavrijsen, P. Onck, J. den Toonder, under review at **Actuators and Sensors B**

## UNDER REVIEW

1. [Anti-ferromagnetically coupled domain walls in perpendicular bilayers](#), D. Petit, K.D. Hakkell, [R. Lavrijsen](#) et al., under review at **Applied Physics Letters** (2017)

## PRESENTATIONS

- i. ***(Invited)* On spin-orbit torques, chiral magnetization textures and e-control of magnetization in ultrathin multilayers**  
[R. Lavrijsen](#), H.J.M. Swagten, B. Koopmans  
International Conference on Nanoscale Magnetism, Turkey  
(September 2016) cancelled due to political situation in Turkey
- ii. **Manipulating the RKKY coupling strength by electric fields**  
[R. Lavrijsen](#), M. Laliou, R. Raijmakers, H.J.M. Swagten, B. Koopmans  
IEEE 2016 International Symposium On Metallic Multilayers, Uppsala, Sweden  
(June 2016)
- iii. ***(Invited)* Asymmetric exchange in Pt/Co/Ir/Pt multilayers**  
[R. Lavrijsen](#), R. Duine, H.J.M. Swagten, B. Koopmans  
Wiesendanger group Symposium, Hamburg, Germany  
(June 2015)
- iv. ***(Invited)* Domain-walls, magnetic bubbles, and the Dzyaloshinskii-Moriya interaction?**  
[R. Lavrijsen](#), D. Hartmann, R. Duine, H.J.M. Swagten, B. Koopmans  
SPRING2015, Spring meeting EMRS, Lille, France  
(May 2015)
- v. ***(Invited)* Symmetric exchange and charging the interlayer exchange coupling**  
[R. Lavrijsen](#), D. Hartmann, R. Duine, H.J.M. Swagten, B. Koopmans  
Thin Film Magnetization Group Symposium, Cambridge, UK  
(March 2015)
- vi. **Tuning asymmetric exchange: towards an ideal racetrack memory?**  
[R. Lavrijsen](#), H.J.M. Swagten, B. Koopmans  
COBRA symposium, TU/e, Eindhoven, The Netherlands  
(February 2015)
- vii. ***(Invited)* Domain-wall depinning governed by the spin Hall effect and Dzyaloshinskii-Moriya interaction**  
[R. Lavrijsen](#), J.H. Franken, D. Hartmann, R. Duine, H.J.M. Swagten, B. Koopmans  
59<sup>th</sup> Annual Magnetism & Magnetic Materials Conference, Honolulu, Hawaii  
(November 2014)
- viii. ***(Invited)* On domain-walls and spin-orbit torques**  
[R. Lavrijsen](#), H.J.M. Swagten, P.J. Haazen, E. Mure, J.H. Franken, B. Koopmans  
Deutsche Physikalische Gesellschaft Spring Meeting, Dresden, Germany  
(April 2014)
- ix. **On spin-orbitronics and 3D soliton ratchets**  
[R. Lavrijsen](#), H.J.M. Swagten, P.J. Haazen, E. Mure, J.H. Franken, B. Koopmans, J-H. Lee, A. Fernandez-Pacheco, D. Petit, R. Mansell, R.P. Cowburn  
Physics@FOM Meeting, Veldhoven, The Netherlands  
(January 2014)

- x. ***(Invited)* On spin-orbitronics, soliton ratchets and domain walls**  
R. Lavrijsen; Workshop: Spintronics: Its Frontiers, Challenges and Opportunities  
 Nanyang Technological University Singapore, Singapore  
*(January 2014)*
- xi. ***(Invited)* Domain-wall depinning governed by the spin Hall effect**  
R. Lavrijsen, H.J.M. Swagten, P.J. Haazen, E. Mure, J.H. Franken, B. Koopmans  
 Joint European Magnetism Symposia, Rhodes, Greece  
*(August 2013)*
- xii. ***(Invited)* Multiple soliton propagation through a magnetic superlattice**  
R. Lavrijsen, J-H. Lee, A. Fernandez-Pacheco, D. Petit, R. Mansell, R.P. Cowburn  
 IEEE 2013 International Symposium On Metallic Multilayers, Kyoto, Japan  
*(May 2013)*
- xiii. ***(Invited)* Towards fully 3-dimensional spintronics - MRAM**  
R. Lavrijsen, J-H. Lee, A. Fernandez-Pacheco, D. Petit, R. Mansell, R.P. Cowburn  
 IMEC, Leuven, Belgium  
*(December 2012)*
- xiv. **3D spintronics: Perpendicularly magnetized soliton ratchet**  
R. Lavrijsen, J-H. Lee, A. Fernandez-Pacheco, D. Petit, R. Mansell, R.P. Cowburn  
 Joint European Magnetic Symposia, Parma, Italy  
*(September 2012)*
- xv. **Single perpendicularly magnetized CoFeB layers for 3D spintronics**  
R. Lavrijsen, A. Fernandez-Pacheco, D. Petit, J-H. Lee, R. Mansell, R.P. Cowburn  
 Intermag, IEEE International Magnetism Conference, Vancouver, Canada  
*(May 2012)*
- xvi. **Domain walls in perpendicularly magnetized stripes violating spin-transfer torque?**  
R. Lavrijsen, J.T. Kohlhepp, H.J.M. Swagten, B. Koopmans  
 55<sup>th</sup> Annual Conference on Magnetism & Magnetic Materials, Atlanta, USA  
*(November 2010)*
- xvii. ***(Invited)* Domain walls in perpendicularly magnetized stripes violating spin-transfer torque?**  
R. Lavrijsen, J.T. Kohlhepp, H.J.M. Swagten, B. Koopmans  
 IEEE 2010 International Symposium On Metallic Multilayers, Berkeley, USA  
*(September 2010)*
- xviii. **Perpendicular Pt / CoFeB / Pt, a tunable system for domain wall dynamics**  
R. Lavrijsen, G. Malinowski, J.T. Kohlhepp, H.J.M. Swagten, B. Koopmans  
 53<sup>rd</sup> Annual Conference on Magnetism & Magnetic Materials, Austin, Texas, USA  
*(November 2008)*

## SUPERVISED MASTER/BACHELOR STUDENTS

1. M.Sc. Michael Beljaars (2008), *Electron beam induced deposition of Iron*
2. B.Sc. Joris Jongen (2008), *Quantitative Magnetic Force Microscopy*
3. B.Sc. Rik Paesen (2008), *Field driven and current induced domain wall motion*
4. M.Sc. Coen Loermans (2009), *Magnetic properties of perpendicularly magnetized ultrathin Pt/CoFeB/Pt films*
5. M.Sc. Paul Janssen (2009), *The nanostencil process*
6. B.Sc. Tim Weekenstro (2009), *Ion Beam Milling*
7. B.Sc. Roger Bosch (2009), *Determination of the magnetic properties of EBID-deposited Fe nanowires through the AMR effect*
8. B.Sc. Can Avci (2009), *Magnetic characterization of Co/Pt single layer with perpendicular magnetization*
9. M.Sc. Frank Schoenaker (2010), *Exploring the fabrication of ferromagnetic nanostructures by Electron Beam Induced Deposition*
10. M.Sc. Jeroen Franken (2010), *Domain wall motion in perpendicularly magnetized ultrathin Pt/CoFeB/Pt films*
11. M.Sc. Paul Soto (2010), *Nano-stencil fabrication for spin-torque devices*
12. M.Sc. Geerit Kruis (2011), *Racing domain walls*
13. M.Sc. Tim Ellis (2011), *Novel Deposition of Magnetic Nanostructures*
14. B.Sc. Mark Lalieu (2012), *Towards a working 3D data storage device*
15. B.Sc. Dion Hartmann UU (2014), *Domain-wall motion in materials with perpendicularly magnetic anisotropy*
16. M.Sc. Mark Lalieu (2014), *Charging the interlayer exchange coupling*
17. M.Sc. Juriaan Lucassen (2015), *Determining the Spin Hall Effect using superconducting tunnelling spectroscopy*
18. M.Sc. Dorris Slapak (2016), *Growing BaTiO<sub>3</sub> for future magnetic memory devices*
19. M.Sc. Guido Hendriks (2016), *Synthetic-Multiferroic heterostructures with the Spin Hall Effect*
20. M.Sc. Pim van Nispen (2017), *Characterising the Dzyaloshinskii-Moriya effect by magnetic bubble expansion*
21. M. Sc. Rens Raijmakers (2016), *Tunable interlayer exchange coupling*
22. Paul de Brouwer (2017), *Tunable interlayer exchange coupling*
23. Rick Ernst (M. Sc. Expected 2018), *Magnetic SAF nanoparticles or bio and cancer treatment*
24. Jelte Schlatmann (B.Sc. Expected 2017) *3D vector magnet for anisotropy mapping*
25. Amber Heskens (B.Sc. Expected 2018) *Theory for 3D magnonics (together with Rembert Duine)*

## Non-refereed articles

1. **Driedimensionale Chips**  
R. Lavrijsen, *N! Periodieke uitgave VENI*, 2014
2. **Driedimensionale Chips!**  
R. Lavrijsen, *NTvN*, 2014
3. **MgO als Tunnel Barriere**  
R. Lavrijsen, H.J.M. Swagten, P.V. Paluskar, B. Koopmans, *NEVAC blad*, 2008

**Other**

- 1. Magneetjes bouwen**  
Antje Veld, R. Lavrijsen, *Experiment NL*, 2015
- 2. Een spintronics flatgebouw**  
Tom Jeltjes, R. Lavrijsen, *CURSOR, TU/e*, 2014
- 3. Winner National quiz (National TV)**  
VPRO, December 2016
- 4. PhD over the years**  
Antoinnette van der Vorst, R. Lavrijsen, *SLASH, TU/e Alumni paper* September 2017