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Matthias Benjamin Jungfleisch

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Researcher ID: `http://www.researcherid.com/rid/G-1069-2015`
Google scholar: `https://scholar.google.com/citations?user=d9G4KxYAAAAJ&hl`

Education

2010 – 2013 **Ph.D. physics**, *Technische Universität Kaiserslautern*, Kaiserslautern, Germany, *Doktor der Naturwissenschaften, October 2013*.
Thesis title: *Spin pumping and inverse spin Hall effect in yttrium iron garnet/platinum heterostructures*
Advisor: Prof. Dr. Burkard Hillebrands

2003 – 2009 **M.S. physics**, *Technische Universität Kaiserslautern*, Kaiserslautern, Germany, *Diplom Physik, November 2009*.
Thesis title: *Wavevector-resolved Brillouin light scattering spectroscopy of nonlinear spin waves*
Advisor: Prof. Dr. Burkard Hillebrands

Research Experience

03/14 – present **Postdoctoral Researcher**, *Argonne National Laboratory*, Argonne, Illinois, United States.
Advisor: Dr. Axel Hoffmann
Research interests: Investigation of spin dynamics and material properties of magnetic thin films and multilayers. The main focus is on magnon spintronics, the field that treats magnons, the elementary quanta of spin waves, in view of transport phenomena. This includes the fabrication and experimental characterization of magnetic and transport properties of a variety of meso- and nanoscale magnetic materials.
Expertise in sputter deposition, e-beam evaporation, photo- and e-beam lithography, vibrating sample magnetometry, magneto-optical Kerr effect, atomic/magnetic force microscopy, magneto-resistance measurements, ferromagnetic resonance and Brillouin light scattering spectroscopy.

12/13 – 02/14 **Visiting Researcher**, *Federal University of Pernambuco*, Recife, Brazil.
Host: Prof. Dr. Sergio M. Rezende
Establish a Brillouin light scattering spectroscopy setup and investigation of linear and nonlinear spin-wave propagation in yttrium iron garnet.

04/12 – 06/12 **Visiting Researcher**, *Institute for Materials Research, Tohoku University*, Sendai, Japan.
Host: Prof. Dr. Eiji Saitoh
Joint research activities on spin pumping and spin Seebeck effect in magnetic insulator/non-magnetic metal hetero-structures.

2010 – 2013 **Graduate Student Researcher**, *Technische Universität Kaiserslautern*, Kaiserslautern, Germany.
Advisor: Prof. Dr. Burkard Hillebrands
- Investigation of spin pumping and spin Hall effect in yttrium iron garnet/platinum bilayers.
- Management of the production of the annual report illustrating scientific work and research activities.

2008 – 2010 **Undergraduate Research Assistant**, *Technische Universität Kaiserslautern*, Kaiserslautern, Germany.
Advisor: Prof. Dr. Burkard Hillebrands
UV lithography and microfabrication.

Mentoring Experience

10/14 – present **Scientific mentor**, *DuPage County ACT-SO program (Afro-Academic, Cultural, Technological and Scientific Olympics) for local African-American high school students to compete at a national level competition*, *Argonne National Laboratory*, Argonne, USA.

2011 – 2012 **V. Lauer, M.S. (Co-advisor)**, *Technische Universität Kaiserslautern*, Kaiserslautern, Germany.
Title: *Optimization of YIG/Pt-bilayers for spin pumping-based applications.*

Teaching Experience

2006 – 2011 **Teaching Assistant**, *Technische Universität Kaiserslautern*, Kaiserslautern, Germany.

- *Exercises: Experimental physics II*, summer term 2011.
- *Physics laboratory*, fall 2010.
- *Exercises: Experimental physics I*, summer term 2010.
- *Exercises: Experimental physics I*, winter term 2007/2008.
- *Exercises: Experimental physics I*, summer term 2007.
- *Physics laboratory*, winter term 2006/2007.

2010 – 2013 **Teacher at vocational school**, *Lehrinstitut für Gesundheitsberufe der SHG*, Saarbrücken, Germany, Subject: physics.

2006 – 2008 **Teacher at tutoring center**, *Archimedes Lernstudio*, Homburg/Saar, Germany, Subjects: mathematics and physics.

Awards

05/2015 Argonne ACT-SO High School Scientific Mentorship Award.
Award in mentoring high-school students in scientific projects for national level competition.

06/2014 Award by the Foundation of the Kreissparkasse Kaiserslautern for an outstanding Ph.D. thesis.

Languages

German	**native**
English	**fluent**
French	**basic**

Computer skills

Python	Basic programming
N.I. LabView	Basic programming and automation of instruments

Publications

Submitted or accepted

[29] J. Ding, P. Lapa, S. Jain, T. Khaire, S. Lendinez, W. Zhang, **M. B. Jungfleisch**, C. M. Posada, V. G. Yefremenko, J. E. Pearson, A. Hoffmann, and V. Novosad, Spin Vortex Resonance in Non-planar Ferromagnetic Dots, *Sci. Rep.*, submitted.

[28] **M. B. Jungfleisch**, W. Zhang, E. Iacocca, J. Sklenar, J. Ding, W.Jiang, S.Zhang, J. E. Pearson, V. Novosad, J. B. Ketterson, O. Heinonen, and A. Hoffmann. Dynamic response of an artificial square spin ice, *Phys. Rev. Lett.*, submitted.

[27] W. Zhang, J. Sklenar, B. Hsu, W. Jiang, **M. B. Jungfleisch**, K. Sarkar, F. Y. Fradin, Y. Liu, J. E. Pearson, J. B. Ketterson, Z. Yang, and A. Hoffmann. Spin transfer torques in Permalloy on monolayer MoS2, *APL Mat.*, submitted.

[26] **M. B. Jungfleisch**, W. Zhang, J. Sklenar, W. Jiang, J. E. Pearson, J. B. Ketterson, and A. Hoffmann. Interface-driven spin-torque ferromagnetic resonance by Rashba coupling at the interface between non-magnetic materials, arXiv:1508.01410 [cond-mat.mes-hall] (2015).

[25] W. Jiang, W. Zhang, G. Yu, **M. B. Jungfleisch**, Y. Tserkovnyak, K. L. Wang, O. Heinonen, S. G. E. te Velthuis, and A. Hoffmann Magnetic skyrmions at room temperature: status and future, *AIP Adv.*, in press.

[24] J. Sklenar, W. Zhang, **M. B. Jungfleisch**, W. Jiang, H. Saglam, J. E. Pearson, J. B. Ketterson, and A. Hoffmann. Spin Hall effects in metallic antiferromagnets – perspectives for future spin-orbitronics, *AIP Adv.*, in press.

Published

[23] **M. B. Jungfleisch**, W. Zhang, J. Sklenar, J. Ding, W. Jiang, H. Chang, F. Y. Fradin, J. E. Pearson, J. B. Ketterson, V. Novosad, M. Wu, and A. Hoffmann. Large spin-wave bullet in a ferrimagnetic insulator driven by spin Hall effect, *Phys. Rev. Lett.* **116**, 057601 (2016).

[22] **M. B. Jungfleisch**, W. Zhang, J. Ding, W. Jiang, J. Sklenar, J. E. Pearson, J. B. Ketterson, and A. Hoffmann. All-electrical detection of spin dynamics in magnetic antidote lattices by the inverse spin Hall effect, *Appl. Phys. Lett.* **108**, 052403 (2016).

[21] V. Lauer, D. A. Bozhko, T. Brächer, P. Pirro, V. I. Vasyuchka, A. A. Serga, **M. B. Jungfleisch**, M. Agrawal, Yu. V. Kobljanskyj, G. A. Melkov, C. Dubs, B. Hillebrands, and A. V. Chumak. Spin-transfer torque based damping control of parametrically excited spin waves in a magnetic insulator, *Appl. Phys. Lett.* **108**, 012402 (2016).

[20] **M. B. Jungfleisch**, W. Zhang, W. Jiang, and A. Hoffmann. New pathways towards efficient metallic spin Hall spintronics, *SPIN* **05**, 1530005 (2015).

[19] W. Zhang, **M. B. Jungfleisch**, F. Freimuth, W. Jiang, J. Sklenar, J. E. Pearson, J. B. Ketterson, Y. Mokrousov, and A. Hoffmann. All-electrical manipulation of magnetization dynamics in a ferromagnet by antiferromagnets with anisotropic spin Hall effects, *Phys. Rev. B* **92**, 144405 (2015).

[18] J. Sklenar, W. Zhang, **M. B. Jungfleisch**, W. Jiang, H. Chang, J. E. Pearson, M. Wu, J. B. Ketterson, and A. Hoffmann. Driving and detecting ferromagnetic resonance in insulators with the spin Hall effect, *Phys. Rev. B* **92**, 174406 (2015).

[17] W. Jiang, P. Upadhyaya, W. Zhang, G. Yu, **M. B. Jungfleisch**, F. Y. Fradin, J. E. Pearson, Y. Tserkovnyak, K. L. Wang, O. Heinonen, S. G. E. te Velthius, and A. Hoffmann. Blowing Magnetic Skyrmion Bubbles, *Science* **349**, 283 (2015).

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[16] A. Kehlberger, R. Röser, G. Jakob, U. Ritzmann, D. Hinzke, U. Nowak, M. C. Onbasli, D. H. Kim, C. A. Ross, **M. B. Jungfleisch**, B. Hillebrands, and M. Kläui. Length Scale of the Spin Seebeck Effect, *Phys. Rev. Lett.* **115**, 096602 (2015).

[15] W. Zhang, **M. B. Jungfleisch**, W. Jiang, J. E. Pearson, F. Freimuth, Y. Mokrousov, and A. Hoffmann. Reduced spin Hall effects from magnetic proximity, *Phys. Rev. B.* **91**, 115316 (2015).

[14] **M. B. Jungfleisch**, A. V. Chumak, A. Kehlberger, V. Lauer, D. H. Kim, M. C. Onbasli, C. A. Ross, M. Kläui, and B. Hillebrands. Thickness and power dependence of the spin-pumping effect in YIG/Pt heterostructures measured by the inverse spin Hall effect, *Phys. Rev. B* **91**, 134407 (2015).

[13] **M. B. Jungfleisch**, W. Zhang, W. Jiang, H. Chang, J. Sklenar, S. M. Wu, J. E. Pearson, A. Bhattacharya, J. B. Ketterson, M. Wu, and A. Hoffmann. Spin waves in micro-structured yttrium iron garnet nanometer-thick films, *J. Appl. Phys.*, **117**, 17D128 (2015).

[12] W. Zhang, **M. B. Jungfleisch**, W. Jiang, J. Sklenar, F. Y. Fradin, J. E. Pearson, J. B. Ketterson, and A. Hoffmann. Spin pumping and inverse spin Hall effects - insights for future spin-orbitronics (invited), *J. Appl. Phys.*, **117**, 172610 (2015).

[11] W. Zhang, **M. B. Jungfleisch**, W. Jiang, J. E. Pearson, and A. Hoffmann. Spin pumping and inverse Rashba-Edelstein effect in NiFe/Ag/Bi and NiFe/Ag/Sb, *J. Appl. Phys.*, **117**, 17C727 (2015).

[10] W. Zhang, **M. B. Jungfleisch**, W. Jiang, J. E. Pearson, F. Freimuth, Y. Mokrousov, and A. Hoffmann. Spin Hall effects in metallic antiferromagnets, *Phys. Rev. Lett.*, **113**, 196602 (2014).

[9] M. Agrawal, V. I. Vasyuchka, A. A. Serga, A. Kirihara, P. Pirro, T. Langner, **M. B. Jungfleisch**, A. V. Chumak, E. Th. Papaioannou, and B. Hillebrands. Role of bulk-magnon transport in the temporal evolution of the longitudinal spin-Seebeck effect, *Phys. Rev. B* **89**, 224414 (2014).

[8] **M. B. Jungfleisch**, V. Lauer, R. Neb, A. V. Chumak, and B. Hillebrands. Improvement of YIG/Pt interface for spin pumping-based applications. *Appl. Phys. Lett.*, **103**, 022411 (2013).

[7] T. An, V. I. Vasyuchka, K. Uchida, A. V. Chumak, K. Yamaguchi, K. Harii, J. Ohe, **M. B. Jungfleisch**, Y. Kajiwara, H. Adachi, B. Hillebrands, S. Maekawa, and E. Saitoh. Unidirectional spin-wave heat conveyer. *Nature Mater.*, **12**, 549 (2013).

[6] **M. B. Jungfleisch**, T. An, K. Ando, Y. Kajiwara, K. Uchida, V. I. Vasyuchka, A. V. Chumak, A. A. Serga, E. Saitoh, and B. Hillebrands. Heat-induced damping modification in yttrium iron garnet/platinum hetero-structures. *Appl. Phys. Lett.*, **102**, 062417 (2013).

[5] A. A. Serga, C. W. Sandweg, V. I. Vasyuchka, **M. B. Jungfleisch**, B. Hillebrands, A. Kreisel, P. Kopietz, and M. P. Kostylev. Brillouin light scattering spectroscopy of parametrically excited dipole-exchange magnons. *Phys. Rev. B*, **86**, 134403 (2012).
Selected as Editors' Suggestion.

[4] A. V. Chumak, A. A. Serga, **M. B. Jungfleisch**, R. Neb, D. A. Bozhko, V. S. Tiberkevich, and B. Hillebrands. Direct detection of magnon spin transport by the inverse spin Hall effect. *Appl. Phys. Lett.*, **100**, 082405, (2012).

[3] **M. B. Jungfleisch**, A. V. Chumak, V. I. Vasyuchka, A. A. Serga, B. Obry, H. Schultheiss, P. A. Beck, A. D. Karenowska, E. Saitoh, and B. Hillebrands. Temporal evolution of inverse spin Hall effect voltage in a magnetic insulator-nonmagnetic metal structure. *Appl. Phys. Lett.*, **99**, 182512 (2011).
Selected for publication in: Vir. J. Nan. Sci. & Tech., **24**, 11 (2011).

[2] C. W. Sandweg, Y. Kajiwara, A. V. Chumak, A. A. Serga, V. I. Vasyuchka, **M. B. Jungfleisch**, E. Saitoh, and B. Hillebrands. Spin pumping by parametrically excited exchange magnons. *Phys. Rev. Lett.*, **106**, 216601, (2011).
Selected as Editors' suggestion and highlighted in Physics **4**, 40 (2011).

[1] C. W. Sandweg, **M. B. Jungfleisch**, V. I. Vasyucka, A. A. Serga, P. Clausen, H. Schultheiss, B. Hillebrands, A. Kreisel, and P. Kopietz. Wide-range wavevector selectivity of magnon gases in Brillouin light scattering spectroscopy. *Rev. Sci. Instrum.*, **81**, 073902 (2010).

Presentations

Invited presentations

Expected, 03/16 **M. B. Jungfleisch**:
Electrically driven magnetization dynamics in yttrium iron garnet,
APS March Meeting 2016, Baltimore, Maryland, USA.

Invited seminars

08/15 **M. B. Jungfleisch**, W. Zhang, J. Sklenar, W. Jiang, J. Ding, H. Chang, F. Y. Fradin, J. E. Pearson, J. B. Ketterson, V. Novosad, M. Wu, and A. Hoffmann:
Spin-torque driven magnetization dynamics by interface- and bulk spin-orbital phenomena,
Technische Universität Kaiserslautern, Kaiserslautern, Germany.

05/15 **M. B. Jungfleisch**, W. Zhang, J. Sklenar, W. Jiang, J. Ding, H. Chang, F. Y. Fradin, J. E. Pearson, J. B. Ketterson, M. Wu, and A. Hoffmann:
Excitation and Detection of Magnetization Dynamics in Insulators by Spin Hall Effects,
IEEE Magnetics Society, Santa Clara Valley Chapter, San Jose, California, USA.

06/14 **M. B. Jungfleisch**:
Spin pumping and inverse spin Hall effect in metallic ferromagnet structures,
Technische Universität Kaiserslautern, Kaiserslautern, Germany.

12/13 **M. B. Jungfleisch**:
Spin pumping and inverse spin Hall effect in yttrium iron garnet/platinum heterostructures,
Universidade Federal de Pernambuco, Recife, Brazil.

01/13 **M. B. Jungfleisch**, V. Lauer, R. Neb, D. A. Bozhko, V. S. Tiberkevich, A. V. Chumak, A. A. Serga, and B. Hillebrands:
Spin pumping and inverse spin Hall effect in yttrium iron garnet/platinum heterostructures,
Argonne National Laboratory, Argonne, Illinois, USA.

04/12 **M. B. Jungfleisch**:
Spin pumping/spin Hall effects in YIG/Pt bilayer structures,
Tohoku University, IMR, Sendai, Japan.

Contributed presentations

10/15 **M. B. Jungfleisch**, O. Heinonen, and A. Hoffmann:
Exploring magnetic frustration - Dynamics of artificial spin ice,
LDRD day 2015, Argonne National Laboratory, Argonne, Illinois, USA.

03/15 **M. B. Jungfleisch**, W. Zhang, W. Jiang, S. M. Wu, J. E. Pearson, A. Bhattacharya, A. Hoffmann, J. Sklenar, J. B. Ketterson, H. Chang, and M. Wu:
Spin dynamics in patterned nanometer-thick yttrium iron garnet films,
APS March Meeting 2015, San Antonio, Texas, USA.

03/15 J. Sklenar, W. Zhang, **M. B. Jungfleisch**, W. Jiang, H. Saglam, S. Grudichak, J. E. Pearson, J. B. Ketterson, and A. Hoffmann:
Spin-torque ferromagnetic resonance studies in out-of-plane magnetization configurations,
APS March Meeting 2015, San Antonio, Texas, USA.

11/14 **M. B. Jungfleisch**, W. Zhang, W. Jiang, F. Y. Fradin, J. E. Pearson, and A. Hoffmann:
DC voltage generation in a pure permalloy layer under ferromagnetic resonance,
59th Annual Magnetism & Magnetic Materials Conference, Honolulu, Hawaii, USA.

11/14 **M. B. Jungfleisch**, W. Zhang, W. Jiang, H. Chang, J. E. Pearson, M. Wu, and A. Hoffmann:
Spin waves in micro-structured yttrium iron garnet thin film,
59th Annual Magnetism & Magnetic Materials Conference, Honolulu, Hawaii, USA.

04/13 **M. B. Jungfleisch**, V. Lauer, R. Neb, A. V. Chumak, and B. Hillebrands:
Optimization of YIG/Pt interface for spin pumping-based applications,
Newspin3, Mainz, Germany.

03/13 **M. B. Jungfleisch**, T. An, K. Ando, Y. Kajiwara, K. Uchida, V. I. Vasyuchka, A. V. Chumak, A. A. Serga, E. Saitoh, and B. Hillebrands:
Heat-induced damping manipulation in YIG/Pt hetero-structures,
DPG-Frühjahrstagung, Regensburg, Germany.

03/13 **M. B. Jungfleisch**, V. Lauer, R. Neb, A. V. Chumak, and B. Hillebrands:
Optimization of spin pumping in YIG/Pt structures,
DPG-Frühjahrstagung, Regensburg, Germany.

01/13 **M. B. Jungfleisch**, T. An, K. Ando, Y. Kajiwara, K. Uchida, V. I. Vasyuchka, A. V. Chumak, A. A. Serga, B. Hillebrands, and E. Saitoh:
Heat-induced spin-transfer torque in YIG/Pt structures,
12th Joint MMM/Intermag Conference, Chicago, Illinois, USA.

08/12 **M. B. Jungfleisch**, A. V. Chumak, A. A. Serga, R. Neb, D. A. Bozhko, V. S. Tiberkevich, and B. Hillebrands:
Direct detection of magnon spin transport by the inverse spin Hall effect,
IEEE International Conference on Microwave Magnetism (ICMM2012), TU Kaiserslautern, Germany.

06/12 **M. B. Jungfleisch**, A. V. Chumak, A. A. Serga, R. Neb, D. A. Bozhko, V. S. Tiberkevich, and B. Hillebrands:
Direct detection of magnon spin transport by the inverse spin Hall effect,
4th International Workshop on Spin Caloritronics, Sendai, Japan.

06/12 **M. B. Jungfleisch**, T. An, K. Ando, Y. Kajiwara, K. Uchida, T. Yoshino, H. Nakayama, B. Hillebrands, and E. Saitoh:
Heat-induced spin-transfer torque in YIG/Pt bilayer structures,
4th International Workshop on Spin Caloritronics, Sendai, Japan.

08/11 **M. B. Jungfleisch**, C. W. Sandweg, Y. Kajiwara, A. V. Chumak, V. I. Vasyuchka, A. A. Serga, B. Obry, H. Schultheiss, P. A. Beck, A. D. Karenowska, E. Saitoh, and B. Hillebrands:
Inverse spin Hall voltage in a magnetic insulator - nonmagnetic metal structure,
ASPIMATT Workshop and Summer School, Kaiserslautern, Germany.

05/11 **M. B. Jungfleisch**, A. V. Chumak, V. I. Vasyuchka, A. A. Serga, B. Obry, H. Schultheiss, P. A. Beck, A. D. Karenowska, E. Saitoh, and B. Hillebrands:
Temporal behavior of the inverse spin Hall voltage in a magnetic insulator - nonmagnetic metal structure,
IEEE Magnetic Society Summer School, New Orleans, USA.

05/11 **M. B. Jungfleisch**, A. V. Chumak, V. I. Vasyuchka, A. A. Serga, B. Obry, H. Schultheiss, P. A. Beck, A. D. Karenowska, E. Saitoh, and B. Hillebrands:
Temporal behavior of the inverse spin Hall voltage in a magnetic insulator - nonmagnetic metal structure,
Spin Caloritronics III, Leiden, The Netherlands.

03/11 **M. B. Jungfleisch**, A. V. Chumak, V. I. Vasyuchka, A. A. Serga, P. A. Beck, E. Saitoh, and B. Hillebrands
Temporal evolution of spin pumping from a magnetic insulator detected via the inverse spin Hall effect,
DPG-Frühjahrstagung, Dresden, Germany.

10/10 **M. B. Jungfleisch**, A. V. Chumak, V. I. Vasyuchka, A. A. Serga, P. A. Beck, E. Saitoh, and B. Hillebrands:
Temporal behavior of the inverse spin Hall effect induced voltage in magnetic insulator - metal structure,
Joint JST/DFG- Workshop: Spin Wave Aspects in Spintronics, Diemerstein, Germany.

07/10 **M. B. Jungfleisch**:
Brillouin light scattering spectroscopy,
SFB/TRR49 Student Seminar, Höchst-Hassenroth, Germany.

08/09 C. W. Sandweg, **M. B. Jungfleisch**, V. I. Vasyuchka, A. A. Serga, and B. Hillebrands:
Two-dimensional wave-vector resolution in Brillouin light scattering spectroscopy,
International Seminar and Workshop: Magnonics: From Fundamentals to Application, Dresden, Germany.

04/09 **M. B. Jungfleisch**, C. W. Sandweg, V. I. Vasyuchka, A. A. Serga, and B. Hillebrands:
2D k-vector selectivity in Brillouin light scattering spectroscopy of microwave excited spin waves,
Heraeus Sommerschule, Bad Honnef, Germany.

03/09 **M. B. Jungfleisch**, C. W. Sandweg, V. I. Vasyuchka, A. A. Serga, and B. Hillebrands:
2D approach to the k-vector resolution of the Brillouin light scattering spectroscopy,
DPG-Frühjahrstagung, Dresden, Germany.

Professional Services

- Member of the German Physical Society (since 2002).
- Referee for *Nature Nanotechnology, Nature Physics, Nature Communications, Science Advances, Physical Review X, Physical Review Letters, Physical Review B, Applied Physics Letters, Journal of Applied Physics, Journal of Physics D: Applied Physics, Physica E, physica status solidi (b), IEEE Transactions on Magnetics, IEEE Magnetic Letters.*
- Session chair for APS March Meeting.