

Curriculum vitae

Andrei I. Kirilyuk

Full professor (hoogleraar)

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Master's

University/College of Higher Education: Moscow Institute for Physics and Technology and
P.L.Kapitza Institute for Physical Problems, Russian Federation

Date (dd/mm/yy): 30/06/1988

Thesis title: Inelastic light scattering by a moving domain wall

Doctorate

University/College of Higher Education: Université Paris XI Orsay, France

Supervisor ('Promotor'): Dr. J. Ferré

Date (dd/mm/yy): 4/05/1993

Title of thesis: Domain wall dynamics in magnetic media (Mouvement de parois de domaines dans des milieux magnétiques) received with a distinction "Très honorable avec félicitations du jury"

Research activities and principal research achievements

a) Research activities in the chronological order

1986 - 1991 P. Kapitza Institute for Physical Problems, Moscow.

2 years Master stage, afterwards PhD student

Domain wall dynamics in yttrium orthoferrite observed by Doppler frequency-shifted light scattering and Brillouin technique; interaction of the domain wall with phonons at supersonic speeds. A novel concept of experimental setup was developed and brought to operation for such unusual experiments.

1992 - 1993 Laboratoire de Physique des Solides, Université Paris-Sud, Orsay, France

PhD student; 1 fte, fixed term for 18 month

Dynamics of magnetic domain walls in ultrathin magnetic films with perpendicular magnetic anisotropy: velocity, Walker breakdown, thermally-activated dynamics; developing models for the intermediate-range behavior. For the area of ultrathin magnetic films, this was a whole new approach, that later was reproduced in several research groups.

1993 - 1995 Max-Planck-Institut für Mikrostrukturphysik, Halle/Saale, Germany

Postdoc; 1 fte, fixed term for 24 months

Growth of ultrathin magnetic films in UHV and *in-situ* magneto-optical experiments to determine their magnetic properties; structural stability and magnetic phases of metastable Fe and Co films. *In-situ* magnetic domain imaging was developed. The UHV deposition setup was also used for ground-breaking experiments on nonlinear magneto-optics in collaboration with the Radboud University.

1995 - 1998 Research Institute for Materials, Radboud University Nijmegen,
The Netherlands

Marie-Curie postdoctoral fellowship; 1 fte, fixed term

This three-year stay in Nijmegen was devoted to further development of magnetization-sensitive optical second harmonic generation technique and nonlinear magneto-optical microscopy; to the application of these techniques to magnetic metallic multilayers and dielectric oxides. Exceptionally strong effects of quantum well states in nonlinear magneto-optics were discovered, along with unusual magneto-optics in symmetry-broken crystal structures.

1998 - 1999. FOM Institute for Plasma Physics Rijnhuizen, Nieuwegein, The Netherlands

Postdoc; 1 fte, fixed-term

Synthesis and structural studies of atomic transition metal oxide clusters with the help of the free electron laser FELIX; for this, novel tool of the vibrationally-resonant multi-photon ionization of clusters in a gas phase was developed and employed. Ultrashort pulses of FELIX were also used to study nonlinear magneto-optics (IR-visible sum-frequency generation) on magneto-plasmonic structures.

2000 - 2007. Institute for Molecules and Materials, Radboud University Nijmegen,
The Netherlands

Universitairdocent (assistant professor): 1 fte, tenured term

During this term, I investigated the physics of interfaces of magnetic multilayers and liquid crystal / polymers with the help of nonlinear magneto-optics. In addition, the new direction of the ultrafast magnetization dynamics started, soon followed by the breakthrough discoveries of the non-thermal photo-magnetic and opto-magnetic effects in dielectrics, as well as the all-optical switching of magnetization in ferrimagnetic metals. These discoveries made a very large impact on the area of magnetization dynamics and are being further developed in many laboratories in the world.

2008 - 2012. Institute for Molecules and Materials, Radboud University Nijmegen
The Netherlands

Universitair hoofddocent (associate professor): 1 fte, tenured term

In this position I created and developed a new research direction on magnetic clusters various materials, including the development of the experimental base. This involved vibrational spectroscopy with the FELIX free electron laser; measurements of magnetic moments and development of the corresponding theory. In addition, I studied further ultrafast magnetization and spin dynamics, magneto-optics and opto-magnetism; this finally resulted in the fundamental understanding of the all-optical magnetization reversal mechanism.

2012 - present. Institute for Molecules and Materials, Radboud University Nijmegen
The Netherlands

Full professor, chair of Atomic Nanostructures group: 1 fte, tenured term

After establishing the Atomic Nanostructures group, the research on the relation between atomic arrangement, electronic structure, and magnetism could be brought to the new level.

Among the discoveries one could name the mechanism of exchange interaction in sub-nanoparticles of rare-earth metals, the mechanisms of the energy flow between electronic and vibrational systems in clusters of transition metals; non-Heisenberg behavior in iron oxides, multiferroicity of rhodium at the atomic scale, and very strong unquenching of orbital moments.

It has also been demonstrated that the all-optical switching of magnetization can be brought to the nanoscale and is thus very suitable for practical applications.

b) Principal research achievements

Nonlinear magneto-optics

Magnetization-induced Second Harmonic Generation (MSHG) is a surface- and interface sensitive nonlinear optical technique that has received a lot of attention due to its extreme magnetic sensitivity. I worked in this area since 1994 and achieved several important breakthroughs such as the discovery of novel nonlinear magneto-optical effects and their theoretical description, as well as the observation of effects of atomic-scale interface roughness on magnetic properties of thin films. Imaging of magnetic domains with MSHG was also demonstrated as a powerful technique complementary to linear magneto-optics. The technique was applied to a variety of systems, from metallic multilayers to bulk oxides to liquid crystal / polymer interfaces and self-organized bio-assisted viral nanostructures. This research was summarized in a couple of review papers (Kirilyuk 2002, Kirilyuk and Rasing 2005).

Inverse opto-magnetic effects

In 2003, I started with the investigation of magnetization dynamics with femtosecond pump-probe methods. Their applications were first directed to semiconductors, such as non-magnetic InP and ferromagnetic GaMnAs. Life-times of spin-polarized electrons were measured. In addition, an unusual behavior of linear magnetic birefringence in GaMnAs was discovered.

Experiments on antiferromagnetic oxides resulted in a great breakthrough with, among others, 2 Nature publications. First of all, photo-induced dynamics in these materials was shown to happen a hundred times faster than was thought before. Moreover, the properties of these dielectrics were best suited for the observation of so-called inverse opto-magnetic effects: the generation of magnetic fields by ultrashort optical pulses, that allow direct optical, nonthermal control of spins. In addition, the presence of spin-reorientation phase transitions of both 1st and 2nd order allowed to study the dynamics of such transitions. Shaping of femtosecond pulses allowed to prove the underlying microscopic mechanism of these opto-magnetic effects.

Subsequently, metallic magnetic materials were tested with the same novel technique, which resulted in the observation of non-thermal optical excitation of spin dynamics in these systems, that was searched for in vain by many other groups.

This research was recently summarized in several review articles (Kirilyuk *et al.* 2006; Kimel *et al.* 2007, 2008; Kirilyuk, Kimel and Rasing, *Rev. Mod. Phys.* 2010; *Rep. Prog. Phys.* 2013).

All-optical switching of magnetization

In a real seminal discovery, it has been experimentally demonstrated that the magnetization can be manipulated and even reversed by a single 40 fs laser pulse, without any applied magnetic field. This switching is found to follow a novel reversal pathway, that is shown however to depend crucially on the net angular momentum, reflecting the balance of the two opposite sublattices. In particular, optical excitation of ferrimagnetic GdFeCo on a time scale pertinent to the characteristic time of the exchange interaction between the RE and TM spins, i.e. on the time scale of tens of femtoseconds, pushes the spin dynamics into a yet unexplored regime, where the two

exchange-coupled magnetic sublattices demonstrate substantially different dynamics. As a result, the reversal of spins appears to proceed via a novel transient state characterized by a ferromagnetic alignment of the Gd and Fe magnetic moments, despite their ground-state antiferromagnetic coupling.

With this work, optical manipulation of magnetic order by femtosecond laser pulses has developed into an exciting and still expanding research field that keeps being fueled by a continuous stream of new and sometimes counterintuitive results. (see Kirilyuk, Kimel and Rasing, Rep. Prog. Phys. 2013).

Sub-nanometer magnets

In parallel with this work a totally new line of research on magnetic properties of very small clusters has been started and developed. As a starting point, the geometrical conformation of clusters was derived and understood with the help of vibrational spectroscopy and density functional theory. Next, the energy exchange processes between the vibrational and electronic degrees of freedom have been investigated, that allowed to study such difficult issues as electron-phonon coupling at the atomic scale. Further, magnetic properties of these particles appeared to be most unusual, showing the oscillation of the exchange interaction in rare-earth clusters between super-exchange and double-exchange mechanisms; Van Vleck cancellation and de-cancellation in V and Nb; large orbital moments in doped transition metal clusters, and many others.

Educational and other academic activities

Teaching experience and current obligations:

Research practicum for master students (2001 – 2010)

- photoreflexion technique
- quantum Hall effect

Research practicum for master students (2007 – present)

- Magneto-optics

Master course “Nanomagnetism” (6ec) (2003 – 2012)

A completely new course developed, including notes for 14 2-hour lectures; includes basics of magnetism, plus recent developments both in research and technology

Master course “Fundamentals of magnetism” (6ec) (2013 – present)

The "Nanomagnetism" course was fully redesigned, with a stress onto the fundamental aspects of magnetism, origins of exchange and anisotropy energies, micromagnetic and dynamic behavior, transport effects, quantum magnetic phenomena, etc.

Bachelor course “Optica en Sterrenkijker 1 & 2” for the 1st year students (6ec) (2005 – 2010)
geometrical optics, imaging, refraction, diffraction, and interference; practical work with laboratory optical elements and telescopes.

Bachelor course “Optica en Beeldvorming” for the 1st year students (3ec) (2011-2012)
a new course on the basics of geometrical and wave optics

Bachelor course “Golven en Optica” for the 1st year students (3ec) (2015 – present)
geometrical optics, imaging, refraction, diffraction, and interference; practical work with laboratory optical elements and telescopes.

Bachelor course “Quantum mechanics 1 & 2” for 2nd year students (6ec) (2010 – 2015):
a broad introduction into the basics of quantum mechanics and its applications to the electronic structure of small systems (Chemistry and Science students)

Education-trip to Hamburg – Kopenhagen – Uppsala – St.-Petersburg, supervision of 17 students – October 2002

Education-trip to St-Petersburg – Moscow – Novosibirsk, supervision of 20 students – October 2009

Best teacher of the year prize of the Onderwijsinstituut Moleculaire Wetenschappen in 2013 (for Quantum Mechanics 1 & 2)

Chairman of the Examencommissie WiNSt educational institute since May 2016.

PhD theses defended under my supervision:

in the role of co-promotor

- Fredrik Hansteen, *Ultrafast optical control of magnetization in ferrimagnetic garnets* (23/05/2006)
- Ventsislav Valev, *Investigation of ferromagnetic / antiferromagnetic interfaces with magnetization-induced second harmonic generation* (06/12/2006)
- Loïc Le Guyader, *Ultrafast laser-induced spatially modulated excitations in magnetic systems* (02/04/2008)
- Daniel Stanciu, *Laser-induced femtosecond magnetic recording* (03/10/2008)
- Alexandra Kalashnikova, *Ultrafast light-induced dynamics of spins and lattice in iron oxides* (01/04/2009)
- Jan Versluis, *Ultrafast and spectrally selective optical control of spins in semiconductor quantum wells* (13/10/2010)
- Fred Atoneche, *Laser manipulation of atoms and spins: towards smaller and faster magnetic devices* (28/03/2011)
- Kadir Vahaplar, *Ultrafast path for magnetization reversal in ferrimagnetic GdFeCo films* (01/09/2011)
- Dmitri Malik, *Coherent control of angular momentum - a route to ultrafast control of spins* (10/11/2011)
- Chris van Dijk, *Structure and magnetism of atomic clusters* (21/11/2011)
- Johan de Jong, *Laser-induced ultrafast spin dynamics in rare-earth orthoferrites* (15/03/2012)
- Sergij Lazarenko, *Investigation and manipulation of liquid crystal interface structure* (25/04/2012)
- Johan Mentink, *Magnetism on the timescale of the exchange interaction: explanations and predictions* (04/10/2012)

in the role of promotor

- Addis Mekonnen Adamu, *Laser pulse control of spins in ferrimagnetic GdCo(Fe) amorphous alloys* (10/01/2013)
- Ali Reza Khorsand, *Spectroscopic Study of Ultrafast Laser-Induced Magnetization Reversal* (05/03/2013)
- Jan Kisielewski, *Controlling the Magnetic Anisotropy in Ultrathin Metallic Films* (04/07/2013)
- Jeroen Jalink, *Metal clusters: from geometric to electronic and magnetic properties* (23/04/2014)
- Benny Koene, *Magnetization dynamics: coherent precession, optical manipulation, and nanoscale switching* (10/12/2014)
- Lars Peters, *Theory of electronic structure and magnetism of rare-earth and transition-metal clusters* (03/06/2015)
- Dennis Dieleman, *Magnetic and electronic properties of doped metal clusters* (21/12/2015)

Received grants (as (co)proposer)

FOM – programme 32 (October 2000) <i>1D and 2D tunable photonic waveguides</i>	1 OIO + 90 k€
FOM – programme 38 (October 2000) <i>Electronic Structure and Dynamics of Low-dimensional Magnetic Nanostructures</i>	2 OIO + 300 k€
FOM-projectruimte <i>Coherent quantum control of magnetic order</i> granted May 2006	300 k€
FOM-projectruimte <i>Quantum coherence in picometer-size magnets</i> granted October 2009	548 k€
FOM projectruimte <i>Real-time view of electron-phonon coupling</i> granted June 2012	372 k€
Dutch NanoNed initiative: (starting 2003-2004) Nanoelectronic materials: <i>Novel oxides by cluster beam manufacturing</i>	300 k€
NanoSpintronics: <i>Terahertz switching of magnetic memory</i>	300 k€
<i>Spin injection devices based on novel materials</i>	300 k€
<i>Optical spin control in hybrid spintronics devices</i>	300 k€
Dutch national research and technology programme for micro and nano technology NanoNextNL 06B.03 <i>Picosecond Nano-Optical Magnetic Encoding and Retrieval</i>	160 k€
FOM programme <i>Controlling Spin Dynamics in Magnetic Nanostructures</i> granted December 2008	total 3007 k€
FOM programme <i>Exciting Exchange</i> granted December 2014	total 2246 k€
European: (participation in preparation, submission and co-coordination)	
IST project <i>Spin-Polarized Injection in Nanostructures and Devices</i> (SPINOSA) contract ended December 2004	total ~1 M€
RTN network <i>Dynamics in Magnetic Nanostructures</i> (DYNAMICS) contract ended December 2006	total 2 M€
INTAS <i>Tunable magnetic photonic crystals as the new media for photonics</i> , Grant No. 03-51-3784	total 150 k€
INTAS <i>Ultrafast spin dynamics at phase transitions in magnetically ordered systems</i> , Grant No. 05-1000008-8112	total 150 k€
NWO-RFBR <i>Ultrafast magneto-photonics</i>	

Grant No. 047.017.031	total 135 k€
NMP-small EU proposal <i>Ultrafast All-Optical Magnetization Reversal for Magnetic Recording and Laser-Controlled Spintronics</i> (UltraMagnetron) –2008-2011	total ~3 M€
EU RTN Network <i>Femtosecond opto-magnetism and novel approaches to ultrafast magnetism at the nanoscale</i> (FANTOMAS) – starting 2008-2012	total ~3 M€
European large-scale integrating project Oxide materials for electronics applications (IFOX) 2011-2015	total ~11 M€
EU FET project Spintronic-Photonic Integrated Circuit platform for novel Electronics (SPICE) started 2016	total ~2 M€
EU FET project Spinoptical nanoantenna-assisted magnetic storage at few nanometers on femtosecond timescale (FEMTOTERABYTE) starting March 2017	total ~2 M€

Scholarships and prizes

Personal 5-year grant from FOM (in the form of FOM-dakpanconstructie) – 2000
 Best teacher of the year prize of the Onderwijsinstituut Moleculaire Wetenschappen in 2013

Co-ordination of EU projects as a Training Manager:

NOMOKE (Nonlinear magneto-optical Kerr effect studies on thin magnetic films), TMR-Network Contract ERBFMRXCT96-0015 – 1996–2000
 DYNAMICS (Dynamics of magnetic nanostructures) European Research and Training Network, Contract Nr. HPRN-CT-2002-00289 – 2002–2006
 FANTOMAS (Femtosecond opto-magnetism and novel approaches to ultrafast magnetism at the nanoscale) European Initial Training Network, Contract Nr. N 214810, 2008–2012

(Co-)organization of conferences:

Nonlinear Optics of surfaces and Interfaces (NOPTI), October 2001
 Ameland AIO summer school "Advanced Spectroscopy of Complex Systems", June 2010
 Magnetism and Optics Research International Symposium (MORIS), June 2011
 Ameland AIO summer school "Physics of single nano-objects", June 2014
 Ultrafast Magnetism Conference (UMC), October 2015
 Ameland AIO summer school "Bits & Brains", June 2016
 Member International Advisory Committee of Joint European Magnetic Symposia (JEMS)
 Member Steering Committee of European School on Magnetism (ESM)

External collaborations

from Radboud University Nijmegen:

University of Kaiserslautern (G. Niedner-Schatteburg)
Forschungszentrum Julich, Peter Grunberg Institute (S. Blügel)
Helmholtz research center, Berlin (M. Neeb)
University of Uppsala (B. Sanyal, O. Eriksson)
Commonwealth University of Richmond, VA (S.N. Khanna)
University of York (R. Chantrell)
Institute of Physics, University of Bialystok (A. Stupakiewicz, A. Maziewski)
Eindhoven University of Technology (B. Koopmans, J. Kohlhepp)
Centre for Nanostructured Media, The Queen's University of Belfast (A.V. Zayats)
University of Maryland, Baltimore (I.I. Smolyaninov)
Innovent e.V., Jena (D. Berkov)
Institute of Physics, Humboldt University, Berlin (M. Gruyters)
Experimental Physics II, University of Dortmund (D.R. Yakovlev)
Institute of Physics, University of Würzburg (G. Schmidt, L.W. Molenkamp)
College of Science and Technology, Nihon University, Chiba, Japan (A. Itoh, A. Tsukamoto)
University of Kaiserslautern (B. Hillebrands)
Tokyo University of Agriculture and Technology (K. Sato)
MESA+ Institute, University of Twente (J.C. Lodder)
Ioffe Physico-Technical Institute, St.- Petersburg, Russian Federation (R.V. Pisarev, V.N. Gridnev, V.V. Pavlov)
Institute for Theoretical Physics, Freie Universität Berlin (W. Hübner)
Institut d'Electronique Fondamentale, Université Paris-Sud (P. Beauvillain, R. Mégy)

from MPI für Mikrostrukturphysik, Halle/Saale:

Radboud University Nijmegen (Th. Rasing)

from Kapitza Institute for Physical Problems, Moscow:

Moscow State University, Russian Federation (M.V. Chetkin)
University of Turku, Finland (R. Laiho)

Invited lectures

1. Magnetism and exchange interaction in atomic clusters, International workshop on Modern methods of technology and study of nanostructures, Grodno, Belarus, November 2017
2. Magnetism at nano-scale and beyond, International workshop on Symmetry and Ferroics, Saint Petersburg, Russia, November 2017
3. Magnetism at the smallest limit, FELIX user meeting, Nijmegen, November 2017
4. Magnetism at its smallest limit, Huygens colloquium, Nijmegen, October 2017
5. All-optical magnetic switching: making use of fundamental magnetic interactions, 8th International Conference on Metamaterials, Photonic Crystals, and Plasmonics META'17, Incheon, Korea, July 2017
6. Unusual magnetism at sub-nanoscale: exchange interaction, orbital moments, and Kramers degeneracy, Gordon Research Conference on Clusters & Nanostructures, Mount Holyoke College, MA, USA, July 2017
7. Magnetism at its smallest limit, Moscow International Symposium on Magnetism, Moscow, Russia, July 2017
8. Structure and magnetism of atomic clusters, IUVSTA summer school Physics at Nanoscale, Brno, Czech Republic, June 2017
9. Laser-induced magnetization dynamics and switching, IUVSTA summer school Physics at Nanoscale, Brno, Czech Republic, June 2017
10. Unusual magnetism at sub-nanoscale: magnetic deflection experiments of small clusters, Thema 1 IMM colloquium, Nijmegen, May 2017
11. All-optical magnetization switching: mechanisms and time scales, invited seminar at Fritz-Haber-Institut, Berlin, Germany
12. Laser manipulation of magnetism: from basics to laser-induced magnetization dynamics and switching, Ameland PhD school, Ameland, May 2017
13. Magnetization dynamics and switching by laser pulses, 3rd Computational Chemistry Symposium, Thessaloniki, Greece, April 2017
14. All-optical switching: mechanisms and time scales, International Conference on Physics of Quantum Electronics, Snowbird, UT, USA, January 2017
15. All-optical switching: from mechanisms to time scales, Invited Seminar at Argonne National Laboratory, Argonne, IL, USA
16. All-optical switching: mechanisms and time-scales, SPIE Nanospintronics meeting, San Diego, USA, August 2016
17. All-optical switching: fascinating and useful (semi-plenary talk), Joint European Magnetic Symposia JEMS-2016, Glasgow, UK, August 2016
18. Unusual Magnetism at sub-Nanoscale: Exchange Interaction, Orbital Moments, and Multiferroicity, International Conference on Fine Particle Magnetism, Gaithersburg, USA, June 2016
19. All-optical switching in ferrimagnets: from multiscale dynamics to functionality, International Conference on Superconductivity and Magnetism ICSM-2016, Fethiye, Turkey, April 2016
20. Multiscale dynamics as the key to all-optical magnetization reversal, Seminar at Institut d'Electronique Fondamentale, Université Paris-Sud, Orsay, France, March 2015
21. Multiscale dynamics as the key to all-optical magnetization reversal, ICM-2015 International Conference, Barcelona, Spain, July 2015

22. The role of exchange interaction and multiscale dynamics in all-optical magnetic switching, ICMFS-2015, Krakow, Poland, July 2015
23. Magnetic domains: observation and interpretation, seminar at SKF Research Center Benelux, Nieuwegein, September 2015
24. The role of exchange interaction and multiscale dynamics in all-optical magnetic switching, seminar at the University of Bialystok, Bialystok, Poland, October 2015
25. Ultrafast microscopy and spectroscopy of magnetics, International Workshop on Physics and Technology of Nanostructures, Grodno, Belarus, October 2015
26. Higher education in the Netherlands: from kindergarten to PhD, lecture for the directors of education of Grodno State University, Grodno, Belarus, October 2015
27. The role of exchange interaction in all-optical magnetic switching, seminar at SLAC, Stanford, USA, November 2015
28. Multiscale dynamics and the role of exchange interaction in all-optical magnetic switching, EMN Meeting on Ultrafast Research, Las Vegas, USA, November 2015
29. Novel materials by atomic engineering of magnetic moments, hot-topic presentation, MORIS-2015 International Symposium, Penang, Malaysia, December 2015
30. Magnetic exchange interaction atom by atom, COST Nanoalloy Workshop and project meeting, St-Marguerita Ligure, Italy, April 2014
31. Magnetism on a length scale shorter than that of the exchange interaction, First International Workshop on Novel Trends in Physics of Ferroics, St. Petersburg, Russia July 4-6, 2014
32. Magnetism and exchange interaction in atomic Tb clusters (invited poster), International Symposium on Spin-Polarized Electron Physics and Nanomagnetism Halle (Saale), Germany, July 10-13, 2014
33. Channeling Vibrational Energy to Probe the Electronic Density of States in Metal Clusters (hot topic), ISSPIC international conference, Fukuoka, Japan, September 2014
34. Balance of angular momentum and magnetization switching in ferrimagnetic alloys, University of Groningen, Netherlands, November 2014
35. Magnetism and exchange interaction in atomic clusters (in Russian), Kapitza Institute for Physical Problems, Moscow, Russia, November 2014
36. Balance of angular momentum and magnetization switching, Physics in Amazonia, Belem, Para, Brazil, November 2014
37. Balance of angular momentum and magnetization switching in ferrimagnetic alloys and multilayers, Laboratoire Physique des Solides, Université Paris-Sud, Orsay, France, December 2, 2014
38. Ultrafast opto-magnetism: challenges and achievements, Université de Versailles, France, February 2013
39. Laser-induced magnetization switching in ferrimagnetic alloys: love-hate relation between magnetic sublattices, APS March meeting, Baltimore, USA, March 2013
40. Willekeurige verhalen over Rusland (USSR), (Random stories about Russia/USSR) studiereis-seminar Institute for Computing and Information Sciences, Nijmegen, Netherlands, May 2013
41. Magneto-optics of interfaces, Ameland AIO workshop, Ameland, Netherlands, June 2013
42. Magnetism on a length scale shorter than that of the exchange interaction, International conference on nanoscale magnetism ICNM-2013, Istanbul, Turkey, September 2013
43. Magnetism on a length scale shorter than that of the exchange interaction, Donostia

- International conference on nanoscale magnetism and applications DICNMA-2013, San-Sebastian, Spain, September 2013
44. Laser-induced magnetization switching in ferrimagnetic alloys: love-hate relation between magnetic sublattices, Ultrafast Magnetism Conference, Strasbourg, France, October 2013
 45. Magnetism on a length scale shorter than that of the exchange interaction, Magnetism and Optics Research International Symposium MORIS-2013, Saitama, Japan, December 2013
 46. “Ultrafast magnetization dynamics in a system with tunable angular momentum”, International Conference on Magnetism and Magnetic Materials, Scottsdale, AZ, USA – November 2011
 47. “The role of angular momentum in ultrafast magnetization dynamics”, University of Colorado, Colorado Springs, CO, USA – October 2011
 48. “Ultrafast magnetization dynamics in a system with tunable angular momentum”, International Workshop “Magnonics: From Fundamentals to Applications”, Recife, Brazil – August 2011
 49. “Atomic clusters and magnetism on sub-nanometer scale”, Moscow International Symposium on Magnetism, Moscow, Russia – August 2011
 50. “Magnetism in picometers and femtoseconds”, International Workshop “Novel trends in optics and magnetism of nanostructures”, Augustow, Poland – July 2011
 51. “Magnetization dynamics: heat & angular momentum”, International Workshop Spin Caloritronics, Leiden – May 2011
 52. “Magnetization dynamics in a system with tunable angular momentum”, APS March meeting, Dallas, TX – March 2011
 53. “Magnetism in picometers and femtoseconds”, University of Kaiserslautern, Germany – November 2010
 54. “Magnetic oxides on femtosecond and picometer scales”, MicroNano Conference, University of Twente – October 2010
 55. “Magnetization dynamics in a system with tunable angular momentum”, JEMS conference, Krakow, Poland – August 2010
 56. “Magnetism in picometers and nanoseconds”, 2nd Korean-Dutch Spintronics Workshop, Eindhoven – June 2010.
 57. “Magnetic oxides: picometers and femtoseconds”, Villa Conference on Complex Oxide Heterostructures, Santorini, Greece – June 2010.
 58. “Ultrafast optical manipulation of magnetic order”, Eidgenössische Technische Hochschule (ETH) Zürich – May 2010.
 59. “Ultrafast coherent laser manipulation of magnetism”, University of Würzburg, Germany – May 2010.
 60. “Transition metal oxide clusters: from vibrational spectroscopy to magnetic properties”, Humboldt University, Berlin – February 2010.
 61. “Ultrafast coherent laser manipulation of magnetism”, Halle/Saale University – November 2009.
 62. “All-optical spin manipulation in magnetic oxides”, Villa Conference on Complex Oxide Heterostructures, St. Thomas, US Virgin Islands – September 2009
 63. “Ultrafast magnetization dynamics in GdFeCo: system with tunable angular momentum”, Brookhaven National Laboratory, USA – July 2009
 64. “Ultrafast magnetization dynamics in a system with tunable angular momentum”, IBM Almaden Research Center, USA – July 2009

65. "All-optical magnetic recording: a beaten challenge", Georgia Institute of Technology, Atlanta, USA – June 2009
66. "Tunable angular momentum and ultrafast magnetization dynamics in GdFeCo", SLAC National Accelerator Laboratory, Stanford, USA – April 2009
67. "Ultrafast magnetization dynamics in GdFeCo: system with tunable angular momentum", Lawrence Berkeley National Laboratory, Berkeley, USA – April 2009
68. "Heat and opto-magnetism", International Spin Caloritronics Workshop, Leiden, The Netherlands – February 2009
69. "Ultrafast opto-magnetism: fundamentals and applications", 1st Korean-Dutch Spintronics Workshop, Daejeon, South Korea – January 2009
70. "Ultrafast opto-magnetism: challenges and achievements", Technical University Eindhoven, The Netherlands – October 2008
71. "All-optical ultrafast magnetization reversal in GdFeCo", Moscow International Symposium on Magnetism MISM-2008, Moscow, Russian Federation – June 2008
72. "Ultrafast opto-magnetism: challenges and achievements", University of Würzburg, Germany – April 2008
73. "Opto-magnetism: all-optical manipulation of magnetization", Physics@FOM, Veldhoven, The Netherlands – January 2008
74. "All-optical magnetic recording: a beaten challenge", XMRS Workshop and XFEL user meeting, DESY, Hamburg, Germany – January 2008
75. "Ultrafast all-optical magnetic recording: a beaten challenge", Utrecht University, The Netherlands – November 2007
76. "Ultrafast opto-magnetism: challenges and achievements", Surugadaj campus, Nihon University of Technology, Tokyo, Japan – November 2007
77. "Femtosecond opto-magnetism: challenges and achievements", Tokyo Institute of Technology, Yokogama, Japan – October 2007
78. "Ultrafast opto-magnetism: challenges and achievements", Funabashi campus, Nihon University of Technology, Tokyo, Japan – October 2007
79. "Ultrafast opto-magnetism: challenges and achievements", MML-2007 International Conference, Perth, Australia – October 2007
80. "Femtosecond opto-magnetic manipulation and coherent control of magnetic order", Workshop on THz dynamics probed with X-rays, Grenoble, France – September 2007
81. "Ultrafast opto-magnetic control of magnetic order", Seagate Research Center, Pittsburgh, USA – April 2007
82. "Coherent control of magnetic order via opto-magnetic effects", Colloquium of the DFG-Schwerpunkt 1133, Bad Honnef, Germany – April 2007
83. "Ultrafast opto-magnetic manipulation and coherent control of magnetic order", Max-Planck-Institut für Mikrostrukturphysik, Halle/Saale, Germany – March 2007
84. "Opto-magnetism and coherent control of spin dynamics", Technical University Delft, The Netherlands – November 2006
85. "Ultrafast magnetic switching and phase transitions via opto-magnetic interactions", International Workshop on Modern Problems of Spin Dynamics, Strasbourg, France – October 2006
86. "Opto-magnetism and ultrafast manipulation of magnetic solids", Photonics and Semiconductor Nanophysics department, TU/e, Eindhoven, The Netherlands – September 2006

87. “All-optical switching of magnetization: breaking the speed limits“, International Workshop on Properties of ultrathin magnetic films, Bialowieza, Poland – September 2006
88. “Opto-magnetism and coherent control of spin dynamics in magnetic oxides“, E-MRS Fall meeting, Warsaw, Poland – September 2006
89. “Opto-magnetism and ultrafast spin dynamics“, International workshop on Complex structures in condensed matter: from atomic to mesoscopic scales, Göttingen, Germany – July 2006
90. “Opto-magnetism: a road to femtosecond spin dynamics“, Institute of Physics PAN, Warsaw, Poland – February 2006
91. “Opto-magnetism and femtosecond magnetization dynamics“, Department of Physics, University of Bialystok, Poland – February 2006
92. “Magneto-optics of ferromagnetic semiconductor GaMnAs“, Workshop “Novel trends in magnetism: spin dynamics, spintronics, etc.”, Corfu, Greece – October 2005
93. “Non-thermal magnetization control: a quest for ultrafast switching“, IBM-Almaden, USA – October 2005
94. “Ultrafast laser-controlled spin dynamics“, University of Regensburg, Germany – June 2005
95. “Nonlinear magneto-optics: old basics and recent developments“, OSI-IV conference, Aalborg, Denmark – June 2005
96. “Ultrafast laser-induced spin dynamics in antiferromagnets“, CLEO/QELS conference, Baltimore, USA – May 2005
97. “Ultrafast laser-induced dynamics in magnetic dielectrics“, University of Uppsala, Sweden – March 2005
98. “Magnetization dynamics in complex spin structures“, Technical University, Vienna, Austria – January 2005
99. “Macroscopic dynamics in complex spin structures“, Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany – November 2004
100. “Dynamics in complex spin structure“, SPINTEC, Grenoble, France – October 2004
101. “Spin dynamics in complex structures“, Université Paris-Sud, Orsay, France – October 2004
102. “Ultrafast spin dynamics in antiferromagnetic TmFeO_3 “, 20th General Conference Condensed Matter Division EPS, Prague, Czech Rep. – July 2004
103. “Static and dynamics magneto-optical spectroscopy of (Ga,Mn)As“, KNAW workshop “Ultrafast spin and magnetization dynamics“, Amsterdam – June 2004
104. “Laser-induced precessional magnetization dynamics“, MORIS-2004 conference, Yokogama, Japan – May 2004
105. “Nonlinear magneto-optics of surfaces and interfaces“, Nihon University, Tokyo, Japan – May 2004
106. “Magneto-optical measurements of macroscopic magnetization dynamics“, Magneto-Optics workshop, Duisburg, Germany – April 2004
107. “Nonlinear magneto-optics in application to thin films and nanostructures“, Laboratory of Magnetism, University of Brest, France – September 2003
108. “Nonlinear optics in magnetic nanostructures“, Workshop on Mesomagnetism, Spin Dynamics and Spin Electronics, Santorini, Greece – June 2001
109. “Nonlinear magneto-optics“, ISPM International Conference, Sendai, Japan – August 1998

Lecturing on summerschools and masterclasses:

1. "Magnetism for dummies", Ameland summer school, June 2016
2. "Damping of magnetization dynamics", European School on Magnetism, Cluj-Napoca, Romania, August 2015
3. "Controlling Magnetism with Light", European School on Magnetism, Cluj-Napoca, Romania, August 2015
4. "Magnetic interactions: from microscopic mechanisms to trivial phenomenology", FANTOMAS school, August 2014
5. "Correlated materials bottom up", FANTOMAS school, August 2014
6. "Clusters of matter", Ameland summer school, June
7. "Magneto-optics and ultrafast magnetization dynamics: the role of angular momentum", German-Swedish school on modern magnetism, Uppsala, Sweden – September 2010
8. "From magneto-optics to ultrafast manipulation of magnetism", The European School on Magnetism "Time-dependent phenomena in Magnetism", Targoviste, Romania – August 2011
9. "Ultrafast magnetization dynamics: the role of angular momentum", The European School on Magnetism "Time-dependent phenomena in Magnetism", Targoviste, Romania – August 2011
10. "From nonlinear magneto-optics to ultrafast manipulation of magnetism", Ameland AIO summer school, Ameland – June 2010
11. "Ultrafast opto-magnetism: fundamentals and applications", Magnetic Materials in Synchrotron and XFEL X-ray Light, VII Research Course on New X-ray Sciences, DESY, Hamburg, Germany – February 2009
12. "Ultrafast opto-magnetism: challenges and achievements", Magnetic Single Nano-object International School, Nancy, France – November 2008
13. "Femtosecond opto-magnetism", IEEE Magnetic Society Summer School, Colorado Springs, USA – August 2008
14. "All-optical measurements of magnetization dynamics: an experimental introduction", lecture for master students at Nihon University of Technology, Tokyo, Japan – November 2007
15. "Femtosecond opto-magnetism and optical manipulation of magnetic materials", PCI summer school on Condensed Matter Physics, Zuoz, Switzerland – August 2007
16. "Magnetic domains and domain wall dynamics", lecture at the International school for Master and PhD students on Modern problems of spin dynamics, Strasbourg, France – October 2006
17. "Coherent optical control and investigations of solids and nanocrystals", IMM Thematic afternoon on single system studies, Nijmegen – June 2006
18. "Laser-induced subpicosecond spin dynamics", lecture at PhD/Master course organized by iNANO Center, Aalborg, Denmark – June 2005
19. "Spin dynamics in antiferromagnets", Ultrabias summer school, Biarritz, France – September 2004
20. "Spin and magnetization dynamics in semiconductors", Masterclass Ultrafast spin and

magnetization dynamics in magnetic nanostructures”, Amsterdam, The Netherlands – June 2004

21. “Nonlinear magneto-optics of solids: an extremely short introduction”, Brugcollege “Lasers”, Nijmegen – November 2003

List of publications

- Patents

Th. Rasing, A. Kirilyuk, A.V. Kimel, C.D. Stanciu, F. Hansteen, A. Itoh, and A. Tsukamoto, *Magneto-optical switching device and method for switching a magnetizable medium*, Intl. Appl. Nr. PCTNL2006/000264; Intl. Publ. Nr. WO 2007/136243 A1; Publ. date 29-11-2007

Th. Rasing, J. Mentink, A. Kirilyuk, A.V. Kimel, R.F.L. Evans, R.W. Chantrell, T.A. Ostler, and J. Barker, *Magnetization reversal*, Intl. Appl. Nr. PCT/NL2012/050912; Intl. Publ. Nr. WO2013095139 A2; US 20140368303 A1, Publ. date 27-06-2013

- International (refereed) journals

with total more than 7000 citations (Web of Science, January 2018); **h-index = 42**

1. R. Medapalli, D.A. Afanasiev, D.K. Kim, Y. Quessab, S. Manna, S.A. Montoya, A. Kirilyuk, Th. Rasing, A.V. Kimel, E.E. Fullerton, *Multiscale dynamics of helicity-dependent all-optical magnetization reversal in ferromagnetic Co/Pt multilayers*, Phys. Rev. B **96**, 224421 (2017).
2. O. Dzyapko, I. Lisenkov, P. Nowik-Boltyk, V.E. Demidov, S.O. Demokritov, B. Koene, A. Kirilyuk, Th. Rasing, V. Tiberkevich, A. Slavin, *Magnon-magnon interactions in a room-temperature magnonic Bose-Einstein condensate*, Phys. Rev. B **96**, 064438 (2017).
3. R. Logemann, A.N. Rudenko, M.I. Katsnelson, and A. Kirilyuk, *Exchange interactions in transition metal oxides: the role of oxygen spin polarization*, J. Phys. - Cond. Matt. **29**, 335801 (2017).
4. Y. Hashimoto, S. Daimon, R. Iguchi, Y. Oikawa, K. Shen, K. Sato, D. Bossini, Y. Tabuchi, T. Satoh, B. Hillebrands, G.E.W. Bauer, T.H. Johansen, A. Kirilyuk, Th. Rasing, and E. Saitoh, *All-optical observation and reconstruction of spin wave dispersion*, Nature Comm. **8**, 15859 (2017).
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6. J.A. de Jong, A.M. Kalashnikova, R.V. Pisarev, A.M. Balbashov, A.V. Kimel, A. Kirilyuk, and Th. Rasing, *Effect of laser pulse propagation on ultrafast magnetization dynamics in a birefringent medium*, J. Phys. - Cond. Matt. **29**, 164004 (2017).
7. J. Becker, A. Tsukamoto, A. Kirilyuk, J.C. Maan, Th. Rasing, P.C.M. Christianen, and A.V. Kimel, *Ultrafast Magnetism of a Ferrimagnet across the Spin-Flop Transition in High Magnetic Fields*, Phys. Rev. Lett. **118**, 117203 (2017).
8. A. Stupakiewicz, K. Szerenos, D. Afanasiev, A. Kirilyuk and A. V. Kimel, *Ultrafast nonthermal photo-magnetic recording in a transparent medium*, Nature **542**, 71 (2017).
9. V. Chernyy, R. Logemann, J.M. Bakker, and A. Kirilyuk, *Determination of the geometric structure of neutral niobium carbide clusters via infrared spectroscopy*, J. Chem. Phys. **145**, 164305 (2016).
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