

## Curriculum Vitae: Erik Wahlström

Swedish, born 1970.

### Present Position

- March 2015 - Head of department, Department of Physics, Norwegian University of Science and Technology.
- Sept 2015 - Professor, Norwegian University of Science and Technology, Department of Physics, QuSpin (includes 50 % teaching).

### Work Experience

- Aug. 2014 - March 2015 Acting head of department, Norwegian University of Science and Technology, Department of Physics.
- March 2005 - Sept 2015 Associate Professor, Norwegian University of Science and Technology.
- July 2011 - June 2012 Sabbatical year, 1 month at MAX-lab Sweden, 2 Months at Uppsala University (visiting Roland Mathieu), 6 months as Visiting Scholar New York University (visiting Prof. Andrew Kent).
- May 2004 - Feb. 2005 Position as Doktor at Chalmers University of Technology.
- Aug. 2001 - April 2004 Position as post-doc at Aarhus University within EU TMR network project OXIDESURFACES. in the group of Flemming Besenbacher.
- Feb. 1996 - June 2001 Position as a post graduate student in solid state physics, Chalmers University of Technology.

### Administrative activities

- 2015- Head of Department of Physics NTNU.
- 2014-2015 Acting head of Department of Physics NTNU.
- 2013–2015 Deputy head of physics department NTNU (responsibility for research).
- 2008- Member of leader group, Department of physics NTNU.
- 2005-2016 Member of leader group, NTNU Nanolab.
- 2008-2013 Section leader, division of condensed matter physics, NTNU.
- 2010-2011 Director NorFab (Norwegian Micro- and NanoFabrication facility).
- 2008-2010 Director NTNU NanoLab.
- 2008 Participated in the leadership programme at NTNU (*Faglig ledelse*).

- 2005-2009 Chairman of the detail planning committee for the physical clean-room at Nanolab, NTNU.
- 2005-2009 Member of Undervisningsutvalget Institutt for Fysikk NTNU.
- 1998-1999 Elected chairman, the organisation for physics Ph.D. students, also elected representative for the Ph.D. students to board of the School of Physics and Engineering Physics, Chalmers University of Technology.
- 1993-1994 Elected president of Chalmers Barockensemble, a student orchestra, performing more visual than audible interpretations of classical music.

### **Pedagogic activities**

- 2018- Module responsible PhD course in methodology and ethics at PhD level.
- 2013- Member studieprogramrådet for PhD fysikk/biofysikk (leader 2013-2015), NTNU.
- 2013-2015 Member studieprogramrådet for realfagstudier, fysikk, NTNU.
- 2012-2015 Responsible for all physics lab courses of engineering students from other institutes than physics (TFY4102, TFY4104, TFY4106, TFY4108, TFY4115, TFY4120, TFY4125). Have so far initiated and obtained funding for a full restructuring of the course, utilising modern measurement equipment for use of computers and a mix of analytic/numeric/statistic analysis.
- 2010, 2012-2015 Module responsible lithography module within fordypningssemester of the Nanotechnology master study programme NTNU.
- 2006-2011 Member of the studieprogramrådet for Nanoteknologi, NTNU.
- 2007-2008 Developed a course at PhD level on magnetism/spin transport.
- 2005-2010 Responsible for courses TFY4185 and TFY4190, electronics and instrumentation for physics students. Fully reformed the content of the laboratory exercises, to a situation where all students were content and a majority very content with the lab education.
- 2006 Completed the course in pedagogics at NTNU (*PEDUP*).
- 1999-2001 Forming and active member of an organisation for the Ph.D. students at the department of physics for discussing pedagogics and evolving the teaching situation.
- 1996-2001 Teaching duties as PhD student, totally 1 year. Duties involved tutoring of labs and exercises, as well as responsibilities for lab development and maintaining of labs within solid state physics and mechanics.

## **Education**

Feb. 1996 - Dec. 2000 Postgraduate studies in experimental physics in the group of solid state physics, Chalmers university of technology.

Aug. 1991 - Feb. 1996 Master of physics and engineering physics, Chalmers University of Technology.

## **Project leader, scientific grants**

2015-2017 0.4 MNOK. Travel funds for NTNU, synchrotron and neutron based research. Norwegian Research Council.

2010-2014 71 MNOK. Norwegian Micro- and Nano-fabrication facilities (project leader until mid 2011) Norwegian Research Council.

2007-2012 9.8 MNOK. Magnetodynamics of Nanostructured Metal Oxides, NanoMat, Norwegian Research Council.

2007 2.5 MNOK XPS/STM Upgrade (infrastructure investment, NTNU).

2006 100 000 NOK, SmåForsk, for maintaining STM:s, Norwegian Research Council/NTNU.

2006 40 000 NOK, Satsningsområde Materialer, for a preliminary study of the magnetotransport properties of magnetic coordination polymers.

2006-2010 4.8 MNOK, Point Contact Investigations of Structured Magnetic Materials, FriNat, Norwegian Research Council.

## **Participant, scientific grants**

2016-2019 Graphene-NanoClay Systems, Norwegian Research Council.

2012-2017 Strategic institute program on spin transport and dynamics in insulators, metals, and superconductors. Norwegian Research Council.

2009-2013 1.2 MSEK, Magnetotransport in strongly correlated electron systems, Collaboration project with Roland Mathieu (Uppsala University).

2005 400 000 SEK, grant for strengthening supervision in Materialforskarskolan, financed by Stiftelsen för strategisk forskning (Sweden).

## **Project leader, educational projects**

2013-2014 200 000 NOK, IKT i lab.- og regneund. i fysikk; IKT-hjelpemidler (funds for educational lab development, NTNU).

2013-2014 950 000 NOK, upgrade of education lab (infrastructure investment NTNU).

## **Reviewer/commites**

Norwegian representative European spallation source ERIC in-kind committee.

Journal reviewer: Physical Review B, Physical Review Letters, Surface Science, Science, Nature Materials, Journal of Magnetic Materials and Magnetism.

Grant reviewer Netherlands organisation for Scientific Research (2013),

Opponent in doctoral dissertation 3

### **Prizes Awarded**

1 The Golden Möbius Cantilever, for best Oral presentation at The 4th nordic-baltic workshop. May 29-31 2002 Tartu, Estonia.

### **Professional Memberships**

Norsk fysisk selskap.

American Physical Society.

### **PhD/Postdocs**

2016- Suraj Kumar Singh (PhD)

2013-2017 Vegard Flovik (PhD) (Presently: Post Doc Computational Neuroscience, University of Oslo).

2009-2017 André Kapelrud (co-supervisor) (PhD) (Presently: Researcher at SINTEF, Trondheim).

2007-2012 Åsmund Monsen (PhD) (Presently: Lektor in TeachFirst programme Norway).

2006-2010 Magne Saxegaard (PhD) (Presently: R&D engineer at ABB).

2008-2012 Jos Emiel Boeschker (co-supervisor) (PhD). (Presently: Scientist at Paul-Drude Institut für Festkörperelektronik)

2007-2009 DeZheng Yang (Presently: Ass, Prof. at Lanzhou University)

2008-2011 Justin Wells (Presently: Prof. at NTNU).

2009-2011 Fei Song (Presently: Researcher at Shanghai institute of applied physics).

### **Master students**

2014 Bjørn Holst Pettersen, Verner Håkonsen.

2013 Johannes Ofstad.

2010-2011 Kofi Tutu Addo Assuming-Gyimah, Godfred Inkoom.

2010 Eric Aggrey, Egil Wille.

2009 Andre Kapelrud, Aleksander Aksnes.

2008 Elin Gihleng.

2007 Ørjan Bohinen, Eivind Erkeland, Henning Stalheim.

2006 Magne Saxegaard.

### Publication list: Published original articles

43 published articles, 2 Science, 1 PRL, 2 APL  
h-index 17, sum of citations 1672 (Jan. 2020, web of science). h-index  
17, sum of citations 1763 (Jan. 2020, scopus). h-index 18, sum of  
citations 2337 (Jan. 2020, google scholar)

- 43 *Magnetically Enhanced Mechanical Stability and Super-Size Effects in Self-Assembled Superstructures of Nanocubes.* Verner Håkonsen, Gurvinder Singh, Peter S Normile, José A De Toro, Erik Wahlström, Jianying He, Zhiliang Zhang ?? (Advanced Functional Materials) 2019
- 42 *Epitaxial growth of free-standing bismuth film on graphene embedded with nontrivial properties.* Kongchao Shen, Chenqiang Hua, Zhaofeng Liang, Yao Wang, Haoliang Sun, Jinping Hu, Huan Zhang, Haiyang Li, Zheng Jiang, Han Huang, Peng Wang, Zhe Sun, Erik Wahlström, Yunhao Lu, Fei Song. ACS Applied Electronic Materials 1 (9), 1817-1824 (2019).
- 41 *Magneto-dynamic properties of complex oxide -  $La_{0.7}Sr_{0.3}MnO_3/SrTiO_3$  - heterostructure interface.* S Singh, T Bolstad, I Hallsteinsen, T Tybell, E Wahlström Applied Physics Letters 114 (22), 222403 (2019).
- 40 *Twinned domain induced magnonic modes in epitaxial LSMO/STO films.* E Wahlström, F. Maciã, Å. Mosen, J.E. Boschker, P. Nordblad, R. Mathieu, A. Kent, T. Tybell, New Journal of Physics 19 (6), 063002 (2017).
- 39 *Describing synchronization and topological excitations in arrays of magnetic spin torque oscillators through the Kuramoto model.* V. Flovik, F. Maciã, E. Wahlström. Nature Scientific Reports 6, Article number: 32528, doi:10.1038/srep32528, (2016).
- 38 *Thickness and temperature dependence of the magnetodynamic damping of pulsed laser deposited  $La_{0.7}Sr_{0.3}MnO_3$  on (111)-oriented  $SrTiO_3(001)$ .* V. Flovik, F. Maciã, S. Lendinez, J. M. Hernandez, I. Hallsteinsen, T. Tybell, E. Wahlström. Journal of magnetism and magnetic materials, In press. DOI:10.1016/j.jmmm.2016.07.028 (2016).
- 37 *Eddy-current effects on ferromagnetic resonance: spin wave excitations and microwave screening effects.* V. Flovik, B.H. Petersen, E. Wahlström, Journal of Applied Physics **119**, 163903 (2016).
- 36 *Projektbaserad labundervisning inom grundläggande fysik för civilingenjörstudenter*  
E. Wahlström, R. J. Persson, Uniped **38**, 293. (2015).

- 35 *Tailoring the magnetodynamic properties of nanomagnets using magnetocrystalline and shape anisotropies*  
V. Flovik, F. Macia, J. M. Hernandez, R. Brucas, M. Hanson, E. Wahlström. *Physical Review B* **92**, 104406. DOI: 10.1103/PhysRevB.92.104406 (2015).
- 34 *Arrays of elliptical Fe(001) nanoparticles: Magnetization reversal, dipolar interactions, and effects of finite array sizes*  
M. Hanson, R. Brucas, T.J Antosiewicz, R.K. Dumas, B. Hjörvars-son, V. Flovik, E. Wahlström. *Physical Review B*.**92**, 094436. DOI: 10.1103/PhysRevB.92.094436 (2015).
- 33 *Eddy current interactions in a Ferromagnet-Normal metal bilayer structure, and its impact on ferromagnetic resonance lineshapes*  
V. Flovik, F. Macia, A. Kent, E. Wahlström, *Journal of Applied Physics*, **107**, 143902. DOI: 10.1063/1.4917285 (2015).
- 32 *Low-temperature Growth of Bismuth Thin Films with (111) Facet on Highly Oriented Pyrolytic Graphite*  
F. Song, J. Wells, Z. Jiang; M. Saxegaard, E. Wahlström, *ACS Applied Materials and Interfaces*, **7**, 8525-8532. DOI: 10.1021/acsami.5b00264 (2015).
- 31 *One-dimensional spin texture of Bi(441); Quantum Spin Hall properties without a topological insulator*  
M. Bianchi, F. Song, S. Cooil, Å. Monsen, E. Wahlström, J.A. Miwa, E.D.L. Rienks, D.A. Evans, A. Strozecka, J.I. Pascual, M. Leandersson, T. Balasubramanian, Ph. Hofmann, and J.W. Wells, *Physical Review B*, **91**, 165307 (2015).
- 30 *Point contact investigations of film and interface magnetoresistance of LSMO heterostructures on Nb:STO*  
Å. Monsen, J.E. Boschker, R. Mathieu, P. Nordblad, T. Tybell, and E. Wahlström, *Journal of magnetism an magnetic materials*, **374**, 433-439. DOI: 10.1016/j.jmmm.2014.08.089 (2015).
- 29 *Superspin glass state and exchange bias in amorphous Fe/Fe-O core-shell nanoparticles*  
P. Anil Kumar, Gurvinder Singh, Wilhelm R. Glomm, E. Wahlström and R. Mathieu, *Mater. Res. Express* **1** 036103 (2014).
- 28 *Thickness dependence of dynamic and static magnetic properties of pulsed laser deposited  $La_{0.7}Sr_{0.3}MnO_3$  on  $SrTiO_3(001)$*   
Å. Monsen, J. E. Boschker, F. Macia, J. Wells, P. Nordblad, A. Kent, R. Mathieu, T Tybell, and E. Wahlström, *Journal of magnetism an magnetic materials*, **369**, 197-204. DOI: 10.1016/j.jmmm.2014.06.038 (2014).
- 27 *Control of crystallinity and magnetic properties of core-shell Fe nanoparticles via choice of ligand*  
Gurvinder Singh, P. Anil Kumar, Christopher Lundgren, Antonius T.

- J. van Helvoort, Roland Mathieu, Erik Wahlström, Wilhelm R. Glomm, Particle & Particle Systems Characterization, DOI: 10.1002/ppsc.201400032, (2014).
- 26 *The layer-by-layer stoichiometry of  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3/\text{SrTiO}_3$  thin films and interfaces*  
F. Song, Å. Monsen, Z.S. Li, J.W. Wells, and E. Wahlström. Surface and Interface Analysis DOI: 10.1002/sia.5240 (2013).
- 25 *Exploring the accessible frequency range of x-ray detected and phase-resolved ferromagnetic resonance*  
P. Warnicke, R. Knut, E. Wahlström O. Karis, W. E. Bailey, and D. A. Arena. Journal of Applied Physics, **113**, 3, 033904 (2013).
- 24 *In-plane structural order of domain engineered  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$  thin films*  
J.E. Boschker, Å.F. Monsen, M. Nord, R. Mathieu, J.K. Grepstad, R. Holmestad, E. Wahlström and T. Tybell. Philosophical Magazine DOI: 10.1080/14786435.2012.747010 (2013).
- 23 *Training and recovery behaviors of exchange bias in  $\text{FeNi}/\text{Cu}/\text{Co}/\text{FeMn}$  spin valves at high field sweep rates*  
D.Z. Yang, A. Kapelrud, M. Saxegaard, E. Wahlström. Journal of Magnetism and Magnetic Materials, **324**, 19, 3223-3226 (2012).
- 22 *Extracting the near surface stoichiometry of  $\text{BiFe}_{0.5}\text{Mn}_{0.5}\text{O}_3$  thin films; a finite element maximum entropy approach*  
F. Song, Å. Monsen, Z.S. Li, E.-M. Choi, J.L. MacManus-Driscoll, J. Xiong, Q.X. Jia, E. Wahlström, and J.W. Wells. Surface Science, **606**(2324):1771-1776, (2012).
- 21 *Iron-mediated growth of epitaxial graphene on sic and diamond.* S.P. Cooil, F. Song, G.T. Williams, O.R. Roberts, D.P. Langstaff, *et. al.* I. Carbon, **50**(14):5099-5105, (2012).
- 20 *Surface stoichiometry of  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$  during in vacuo preparation; a synchrotron photoemission study*  
Å. Monsen, F. Song, Z.S. Li, J.E. Boschker, T. Tybell, E. Wahlström, and J.W. Wells. Surface Science, **606**(17-18):1360, (2012).
- 19 *Consequences of High Adatom Energy during Pulsed Laser Deposition of  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$*   
Boschker Jos E.; Folven Erik; Monsen Asmund F.; et al. CRYSTAL GROWTH & DESIGN, 12, 2 562-566, DOI: 10.1021/cg201461a1 (2012).
- 18 *Structural coupling across the  $\text{LaAlO}(3)/\text{SrTiO}(3)$  interface: High-resolution x-ray diffraction study*  
Boschker J. E.; Folkman C.; Bark C. W.; et al. Physical review B **84**, 205418, DOI: 10.1103/PhysRevB.84.205418 (2011)
- 17 *Field and current-induced magnetization reversal studied through spatially resolved point-contacts*

- M. Saxegaard, D. Yang, E. Wahlström, R. Brucas, and M. Hanson, J. Appl. Phys. 107, 103909 (2010); doi:10.1063/1.3407539
- 16 *Nanoscale surface modification of La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> thin films*  
Y. Liu, Å. Monsen, J. E. Boschker, E. Wahlström A. Borg, T. Tybell, J. Vac. Sci. Technol. B **28**, Issue 2, pp. 407 (2010)
- 15 *Magnetic and transport properties of Ni<sub>81</sub>Fe<sub>19</sub>/Al<sub>2</sub>O<sub>3</sub> granular multilayers approaching the superparamagnetic limit*  
R. Brucas, M. Hanson, R. Gunnarsson, E. Wahlström, M. van Kampen and B. Hjörvarsson, H. Lidbaum and K. Leifer  
Journal of Applied Physics **101**, 073907 (2007)
- 14 *Scanning tunneling microscopy for laterally-resolved measurements of magnetoresistance through a point contact*  
E. Wahlström, R. Brucas and M. Hanson  
Applied Physics Letters **88**, 112509 (2006)  
Also appeared in March 27, 2006 issue of Virtual Journal of Nanoscale Science and Technology
- 13 *Oxygen vacancies on TiO<sub>2</sub>(110) and their interaction with H<sub>2</sub>O and O<sub>2</sub>: A combined high-resolution STM and DFT study*  
S. Wendt, R. Schaub, J. Matthiesen, E.K. Vestergaard, E. Wahlström, M.D. Rasmussen, P. Thostrup, L.M. Molina, E. Lægsgaard, I. Stensgaard, B. Hammer and F. Besenbacher.  
Surface Science **598**, 226 (2005)
- 12 *Electron Transfer-Induced Dynamics of Oxygen Molecules on the TiO<sub>2</sub>(110) surface*  
E. Wahlström, E. Kruse Vestergaard, R. Schaub, A. Rønnau, M. Vestergaard, E. Lægsgaard, I. Stensgaard, and F. Besenbacher  
Science **303**, 511 (2004)
- 11 *Oxygen-Mediated Diffusion of Oxygen Vacancies on the TiO<sub>2</sub>(110) surface*  
R. Schaub, E. Wahlström, A. Rønnau, E. Lægsgaard, I. Stensgaard and F. Besenbacher.  
Science **299**, 377 (2003).  
Originally published online in Science Express as 10.1126/science.1078962 on December 12, 2002.
- 10 *Bonding of Gold Nano-Clusters to Oxygen Vacancies on Rutile TiO<sub>2</sub>(110)*  
E. Wahlström, N. Lopez, R. Schaub, P. Thostrup, A. Rønnau, C. Africh, E. Lægsgaard, J. Nørskov and F. Besenbacher.  
Physical Review Letters **90**, 026101 (2003).
- 9 *Low-temperature structure of S/Cu(111)*  
E. Wahlström, I.Ekval, T. Kihlgren, H. Olin S.-Å. Lindgren and L. Walldén.  
Physical Review B **64**, 155406 (2001).
- 8 *Metal quantum wells with all electrons confined: Na films and islands*



- on graphite.*  
M. Breitholtz, T. Kihlgren, S.-Å. Lindgren, H. Olin, E. Wahlström, and L. Walldén  
Physical Review B **64**, 073301 (2001).
- 7 *Observation of ordered structures for S/Cu(111) at low temperature and coverage.*  
E. Wahlström, I. Ekvall, H. Olin S.-Å. Lindgren and L. Walldén.  
Physical Review B **60**(15), 10699-10702, (1999).
- 6 *Preparation and characterization of electrochemically etched W tips for STM.*  
I. Ekvall, E. Wahlström, D. Claesson, H. Olin and E. Olsson.  
Measurement Science and Technology **10**, 11-18, (1999).
- 5 *Locally modified charge density waves in Na intercalated of VSe<sub>2</sub> studied by photoemission and scanning tunnelling microscopy.*  
I. Ekvall, H.E. Brauer, E. Wahlström and H. Olin.  
Physical Review B **59**(11), 7751, (1999).
- 4 *Long-range interaction between adatoms at the Cu(111) surface imaged by scanning tunnelling microscopy.*  
E. Wahlström, I. Ekvall, H. Olin and L. Walldén.  
Applied Physics A **66**, S1107-S1110, (1998).
- 3 *Reversal of an adsorption-substitution structure change for Li/Cu(111) induced by O<sub>2</sub> or H<sub>2</sub>O exposure.*  
D. Claesson, S.-Å. Lindgren, E. Wahlström and L. Walldén.  
Physical Review B **57**(7), 3795, (1998).
- 2 *Na intercalation of VSe<sub>2</sub> studied by scanning tunnelling microscopy and spectroscopy.*  
H.E. Brauer, I. Ekvall, H. Olin, H.I. Starnberg, E. Wahlström, H.P. Hughes and V.N. Strocov.  
Physical Review B **55**(15), 10022, (1997).
- 1 *Coverage dependent frequency for Li vibrations on Cu(111).*  
A. Carlsson, S.-Å. Lindgren, C. Svensson, E. Wahlström and L. Walldén.  
Physical Review B **54**(15), 10912, (1996).