CURRICULUM VITAE
Aleksander L. Wysocki

CONTACT INFORMATION:

Department of Physics
University of Nebraska Kearney
Discovery Hall 341
Kearney, NE 68849
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EDUCATION:

December 2009: **Ph.D.** University of Nebraska-Lincoln.
Major: Physics and Astronomy
Title: Finite temperature effects in magnetic materials: Model and ab initio studies
Advisor: Prof. Kirill Belashchenko

August 2005: **M.S.** Adam Mickiewicz University in Poznań, Poland.
Major: Physics

June 2005: **M.S.** Indiana University of Pennsylvania.
Major: Physics

POSITIONS:

2022-current: **Assistant Professor of Physics**, University of Nebraska at Kearney
2018-2022: **Research Scientist**, Virginia Tech University
2013-2018: **Assistant Scientist III**, Ames Laboratory
2012-2013: **Postdoctoral Associate**, Cornell University
2010-2011: **Postdoctoral Research Associate**, University of Nebraska Lincoln

TEACHING EXPERIENCE:

University of Nebraska at Kearney

- **Solid State Physics** (Undergraduate Lecture): Spring 2023
- **Thermodynamics and Statistical Mechanics** (Undergraduate Lecture): Fall 2022, Fall 2024
- **Mathematical Techniques in Physics I** (Undergraduate Lecture): Spring 2023, Spring 2024
- **Computational Methods in Physics and Astronomy** (Undergraduate Lecture/Lab): Fall 2023
  *Developed using OER resources
- **Heat and Thermodynamics** (Graduate Asynchronous Online Lecture): Fall 2024
- **Mathematical Techniques in Physical Sciences** (Graduate Asynchronous Online Lecture): Spring 2023
- **General Physics I (Calculus)** (Undergraduate Lecture): Fall 2022, Fall 2023, Spring 2024
- **General Physics I (Algebra)** (Undergraduate Lecture): Fall 2024
- **Physics I Laboratory** (Undergraduate Lab): Fall 2023
- **Physics II Laboratory** (Undergraduate Lab): Spring 2024
- **Physical Science Laboratory** (Undergraduate Lab): Fall 2022, Spring 2023

University of Nebraska Lincoln

- **Descriptive Physics I** (Undergraduate Recitations): Fall 2005
- **General Physics I** (Undergraduate Recitations): Spring 2006
- **General Physics II** (Undergraduate Recitations): Fall 2006, Spring 2007, Spring 2008
- **Elements of Physics** (Undergraduate Lab): Fall 2007

OUTREACH

- **Sigma Xi Science Café talk:** Next Generation Materials for Quantum Information Science, November 7, 2022, Kearney, NE.
- **UNK Science Day:** Biannual Science Activities for High School Students, Nov. 22nd, 2022; Jan. 27th, 2023; Nov. 11th, 2023; Jan. 26th, 2024, Kearney, NE.
- **Math Counts:** Grader, Feb. 20th, 2023, Kearney, NE.
- **APEs Camp:** Annual STEM Summer Camp for High School, May 23-25, 2023; May 21-23, 2024, Kearney, NE.
- **RET Project Supervision:** Magnetic Properties of Rare Earth Adatoms on Graphene, Summer, 2023, Kearney, NE.
- **ESU10 Elementary Science Olympiad:** Electric circuits activities for elementary school students, Dec. 6-7th, 2023.
- **Quantum Computing for Kearney High School:** Quantum Computing Lecture and Activities for Kearney High School Science Club, Dec. 14th, 2023, Kearney, NE.
- **Delfín Program:** Member of the 2024 Directory of Advisors, Summer, 2024, Kearney, NE.
- **RET Project Supervision:** Teaching Quantum Information Science to High School Students, Summer, 2024, Kearney, NE.

DEPARTMENT AND UNIVERSITY SERVICE

2022-Current:	Member, Curriculum and Assessment Committee, Department of Physics and Astronomy, University of Nebraska at Kearney.
2024-Current:	Member, Oversight Committee, College of Arts and Science, University of Nebraska at Kearney

FUNDING

- National Science Foundation EPSCoR: Subaward from University of Nebraska Lincoln, No. OIA-2044049, $801,200 (Co-PI), *Emergent Quantum Materials and Technologies (EQUATE)*, 06/2021-05/2026.
- Department of Energy EPSCoR: Subaward from University of Nebraska Omaha, No. DE-SC0024284, $295,687 (Co-PI), *A High-Throughput Computational and Experimental Approach to the Design of Unconventional Magnets*, 08/2023-07/2025.

PROFESSIONAL SERVICE AND REVIEW ACTIVITIES:

Journal referee: Physical Review Letters, Physical Review B, Journal of Magnetism and Magnetic Materials, Journal of Applied Physics, Physical Review Research, Physical Chemistry Chemical Physics

ACADEMIC MENTORING

Undergraduate:	Douglas Davidchik (2023 – present)
Postdoc:	Monirul Shaikh (2023 - present); Debajit Chakraborty (2024 – present)

PATENTS AND INVENTION DISCLOSURES:

[1] **Fe_2NiCo layered superstructure as a high-energy-product permanent magnet material**
A.L. Wysocki, M.C. Nguyen, and V.P. Antropov
Invention disclosure at the Iowa State University, ISURF #04659 (2017).

[2] **Magnetoelectric chromia having increased critical temperature**
C. Binek, P.A Dowben, K.D. Belashchenko, A.L. Wysocki, S. Mu, M. Street
US Patent No. 9,718,700 issued August 1, 2017

PUBLICATIONS:

[33] **Relativistic Douglas-Kroll-Hess Calculations of Hyperfine Interactions within First Principles Multireference Methods**
A.L. Wysocki and K. Park
J. Chem. Phys. **160**, 224102 (2024).
(preprint)

[32] **$Tb_2O@C_2(13333)$-C_{74}: A Non-Isolated Pentagon Endohedral Fullerene Containing a Nearly Linear Tb–O–Tb Unit**
J.C. Duchamp, H.C. Dorn, A.L. Wysocki, K. Park, M.M. Olmstead, M. Roy, and A.L. Balch
Inorg. Chem. **62**, 5114 (2023)

[31] **Computational Insights into Electronic Excitations, Spin–Orbit Coupling Effects, and Spin Decoherence in Cr(IV)-Based Molecular Qubits**
K. Janicka, A.L. Wysocki and K. Park
J. Phys. Chem. A, **126**, 8007 (2022).
(preprint)

[30] **A multiconfigurational study of the negatively charged nitrogen-vacancy center in diamond**
C. Bhandari, A.L. Wysocki, S.E. Economou, P. Dev, K. Park
Phys. Rev. B **103**, 014115 (2021).
(preprint)

[29] **Electrically tuned hyperfine spectrum in neutral Tb(II)(Cp^{iPr5})$_2$ single-molecule magnet**
R.L. Smith, A.L. Wysocki, K. Park
Phys. Chem. Chem. Phys. **22**, 21793 (2020).
(preprint)

[28] **Hyperfine and quadrupole interactions for Dy isotopes in $DyPc_2$ molecules**
A.L. Wysocki and K. Park
J. Phys. Condens. Matter **32**, 274002 (2020).
(preprint)

[27] **Nature of hyperfine interactions in $TbPc_2$ single-molecule magnets: Multireference ab-initio study**
A.L. Wysocki and K. Park
Inorg. Chem. **59**, 2771 (2020).
(preprint)

[26] **Toward Long-Range Entanglement between Electrically Driven Single-Molecule Magnets**
K. Najafi, A.L. Wysocki, K. Park, S.E. Economou, and E. Barnes
J. Phys. Chem. Lett. **10**, 7347 (2019).
(preprint)

[25] **Concentration tuned tetragonal strain in alloys: application to magnetic anisotropy of $FeNi_{1-x}Co_x$**
A.L. Wysocki, M.C. Nguyen, C-Z. Wang, K-M. Ho, A.V. Postnikov, and V.P. Antropov
Phys. Rev. B **100**, 104429 (2019).
(preprint)

[24] **Multireference Ab Initio Studies of Magnetic Properties of Terbium-Based Single-Molecule Magnets**
R. Pederson, A.L. Wysocki, N. Mayhall, and K. Park
J. Phys. Chem. A **123**, 6996 (2019).
(preprint)

[23] **Single Crystal Permanent Magnet: Extraordinary Magnetic Behavior in Ta, Cu and Fe Substituted $CeCo_5$ system**
T.N. Lamichhane, M. Onyszczak, O. Palasyuk, S. Sharikadze,T. Kim, M.J. Kramer, R.W. McCallum, A.L. Wysocki, M.C. Nguyen, V.P. Antropov, T. Pandey, D. Parker, S.L. Budko, P.C. Canfield, and A. Palasyuk
Phys. Rev. Applied **11**, 014052 (2019).
(preprint)

[22] **Spin-density fluctuations and the fluctuation-dissipation theorem in 3d ferromagnetic metals**
A. L. Wysocki, V. N. Valmispild, A. Kutepov, S. Sharma, J. K. Dewhurst, E. K. U. Gross, A. I. Lichtenstein, V. P. Antropov
Phys. Rev. B **96**, 184418 (2017).
(preprint)

[21] **Two-magnon Scattering in 5d All-In–All-Out Pyrochlore Magnet $Cd_2Os_2O_7$**
Minh Hien Nguyen, L. Sandilands, Chang Hee Sohn, Choong Hyun Kim, A.L. Wysocki, In-Sang Yang, S.J. Moon, Jae-Hyeon Ko, Zenji Hiroi, Jun-Ichi Yamaura
Nature Communications **8**, 251 (2017).

[20] **Micromagnetic simulations with periodic boundary conditions: Hard-soft nanocomposites**
A.L. Wysocki and V.P. Antropov
J. Magn. Magn. Mater. **428**, 274 (2017).
(preprint)

[19] **Strength and scales of itinerant spin fluctuations in 3d paramagnetic metals**
A. L. Wysocki, A.L. Kutepov, and V.P. Antropov
Phys. Rev. B **94**, 140405(R) (2016).
(preprint)

[18] **Large energy product enhancement in perpendicularly coupled MnBi/CoFe magnetic bilayers**
T.R. Gao, L. Fang, S. Fackler, S. Maruyama, X.H. Zhang, L.L. Wang, T. Rana, P. Manchanda, A. Kashyap, K. Janicka, A. L. Wysocki, A.T. N'Diaye, E. Arenholz, J.A. Borchers, B. J. Kirby, B.B. Maranville, M.J. Kramer, V.P. Antropov, D.D. Johnson, R. Skomski, J. Cui, and I. Takeuchi
Phys. Rev. B **94**, 060411(R) (2016).

[17] **Magnetically induced phonon splitting in ACr_2O_4 spinels from first principles**
A.L. Wysocki and T. Birol
Phys. Rev. B **93**, 134425 (2016)
(preprint)

[16] **First-principles microscopic model of exchange-driven magnetoelectric response with application to Cr_2O_3**
Sai Mu, A.L. Wysocki, K.D. Belashchenko
Phys. Rev. B **89**, 174413 (2014)
(preprint)

[15] **Direct visualization of magnetoelectric domains**
Y. Geng, H. Das, A.L. Wysocki, X. Wang, S-W. Cheong, M. Mostovoy, C.J. Fennie, and W. Wu
Nature Materials **13**, 163 (2014)
* Highlighted by Basic Energy Sciences, U.S. Department of Energy (link)
* Featured in DOE Science News Source (link)
* Featured in Phys.org (link)
* Featured in EurekAlert (link)
* Featured in Scicasts (link)
* Featured in ScienceDaily (link)

[14] **Bulk magnetoelectricity in the hexagonal manganites and ferrites**
H. Das, A.L. Wysocki, Y. Geng, W. Wu, and C.J. Fennie
Nature Communications 5, 2998 (2014)
(preprint)

[13] **Biquadratic magnetic interaction in parent ferropnictides (invited)**
A.L. Wysocki, K.D. Belashchenko, Liqin Ke, M. van Schilfgaarde, V.P. Antropov
J. Phys.: Conf. Ser. **449**, 012024 (2013).

[12] **Effect of substitutional doping on the Neel temperature of Cr_2O_3**
Sai Mu, A.L. Wysocki, K.D. Belashchenko
Phys. Rev. B **87**, 054435 (2013).

[11] **Spin injection from a half-metal at finite temperatures**
K.D. Belashchenko, J.K. Glasbrenner, and A.L. Wysocki
Phys. Rev. B **86**, 224402 (2012).
(preprint)

[10] **The Magnetoelectric Effect in Transition Metal Oxides: Insights and the Rational Design of New Materials from First Principles (invited)**
T. Birol, N.A. Benedek, H. Das, A.L. Wysocki, A.T. Mulder, B.M. Abbett, E.H. Smith, S. Ghosh, C.J. Fennie
Current Opinions in Solid State and Materials Science **16**, 227 (2012).
(preprint)

[9] **Microscopic origin of the structural phase transitions at the Cr_2O_3 (0001) surface**
A.L. Wysocki, Siqi Shi, K.D. Belashchenko
Phys. Rev. B **86**, 165443 (2012).
(preprint)

[8] **Spin filtering with EuO: Insight from the complex band structure**
P.V. Lukashev, A.L. Wysocki, J.P. Velev, M. van Schilfgaarde, S.S. Jaswal, K.D. Belashchenko, E.Y. Tsymbal
Phys. Rev. B **85**, 224414 (2012).

[7] **Consistent model of magnetism in ferropnictides**
A.L. Wysocki, K.D. Belashchenko, V.P. Antropov
Nature Phys. **7**, 482 (2011).
(preprint)

[6] **Imaging and Control of Surface Magnetization Domains in a Magnetoelectric Antiferromagnet**
Ning Wu, Xi He, A.L. Wysocki, U. Lanke, T. Komesu, K.D. Belashchenko, C. Binek, and P.A. Dowben
Phys. Rev. Lett. **106**, 087202 (2011).
* Editors' suggestion

[5] **First-principles analysis of spin-disorder resistivity of Fe and Ni**
A.L. Wysocki, R.F. Sabirianov, K.D. Belashchenko, M. van Schilfgaarde,
Phys. Rev. B **80**, 224423 (2009).
(preprint)

[4] **Magnetism of chromia from first-principles calculations**
Siqi Shi, A.L. Wysocki, K.D. Belashchenko
Phys. Rev. B **79**, 104404 (2009).
(preprint)

[3] **Thermodynamics of itinerant magnets in a classical spin-fluctuation model**
A.L. Wysocki, J.K. Glasbrenner, K.D. Belashchenko
Phys. Rev. B **78**, 184419 (2008).
(preprint)

[2] **Calculations of spin disorder resistivity from first principles**
A.L. Wysocki, K.D. Belashchenko, J.P. Velev, M. van Schilfgaarde
J. Appl. Phys. **101**, 09G506 (2007)
(preprint)
* Selected to Virtual Journal of Nanoscale Science & Technology

[1] **Interference effects in spin dependent transport through Aharanov-Bohm ring with quantum dots**
A.L. Wysocki and J. Barnaś
Acta Physicae Superficierum **9**, 177 (2006)

PRESENTATIONS:

Magnetic properties of lanthanide adatoms on graphene
APS March Meeting, Minneapolis, March 4th – 8th, 2024

Magnetic properties of transition metal and rare-earth adatoms: An ab initio study
Magic Workshop: Magnetism, Interactions and Complexity, Bedlewo, July 24 – 28, 2023

Optical control of nuclear spin states in a nonmagnetic Eu-based molecular qubit
Nebraska Research and Innovation Conference, Lincoln, March 17th, 2023

Nuclear spin spectra for ground and excited multiplets of Eu-based magnetic molecule
APS March Meeting, Las Vegas, March 5th – 10th 2023

Relativistic Douglas-Kroll-Hess Calculations of Hyperfine Interactions within First Principles Multireference Methods
APS March Meeting, Chicago, March 14th – 18th 2022

Relativistic Hyperfine Interaction in Single-Molecule Magnets: Multiconfigurational Study
APS March Meeting, Virtual, March 15th – 19th 2021

Nature of hyperfine interactions in $TbPc_2$ and $DyPc_2$ single-molecule magnets
Molecular Magnetism in North America MAGNA, St. Simons Island, GA, February 21th-24th 2020

Multireference ab initio studies of magnetic properties of $TbPc_2$-type single-molecule magnets in different charge states
APS March Meeting, Boston, March 4th – 8th 2019

Multireference ab-initio studies of magnetic properties of $TbPc_2$-type single-molecule magnets
59th Sanibel Symposium, St. Simons Island, GA, February 17th – 22th 2019

Modeling spin fluctuations in magnetic materials (invited)
University of Northern Iowa, April 2016.

Nature of spin fluctuations in 3*d* paramagnetic metals
MMM Intermag Joint Conference, San Diego, January 11th – 15th 2016

Finite temperature micromagnetic simulations of $Nd_2Fe_{14}B$/Fe nanocomposites
Rare Earth and Future Permanent Magnets and Their Applications Workshop, August 17th – 21st 2014

Hysteretic properties of $Nd_2Fe_{14}B$-based permanent magnets: First principles and micromagnetic modeling
APS March Meeting, Denver, March 3rd – 7th 2014

What controls the sign of magnetically induced phonon splitting in ACr_2O_4 spinels?
APS March Meeting, Baltimore, March 18th – 22th 2013

Magnetically induced phonon splitting in ACr_2O_4 spinels
Fundamental Physics of Ferroelectrics and Related Materials, January 27th – 30th 2013

Microscopic origin of the structural phase transitions at the Cr_2O_3 (0001) surface
24th Annual Workshop on Recent Developments in Electronic Structure Theory, June 5th – 8th 2012

Importance of biquadratic magnetic interaction in ferropnictides (invited)
Adam Mickiewicz University, Poznan, Poland, June 2012.

Consistent model of magnetism in ferropnictides
APS March Meeting, Dallas, March 21th – 25th 2011

Magnetism and structural phase transitions at Cr_2O_3 (0001) surface: An *ab initio* study
55th Conference on Magnetism and Magnetic Materials, Atlanta, November 14th – 18th 2010

Uncompensated magnetization and structural phase transitions at Cr_2O_3 (0001) surface: Theory
APS March Meeting, Portland, March 15th – 19th 2010

Magnetism of bulk Cr_2O_3 and its (0001) surface: An ab initio study
APS March Meeting, Pittsburgh, March 10th – 14th 2009

Effect of thermal spin disorder on transport through magnetic tunnel junctions
APS March Meeting, Pittsburgh, March 10th – 14th 2009

First-principles analysis of spin-disorder resistivity of Fe and Ni
Summer School 'Nanomagnetism and Spintronics', Prague, September 8th – 17th 2008

Spin-disorder resistivity from first principles (invited)
Polish Academy of Science, Poznan, Poland, August 2008

Effect of magnetic short-range order and local moment softening on spin-disorder resistivity
APS March Meeting, New Orleans, March 10th – 14th 2008
Effect of magnetic short-range order on spin-disorder resistivity
52nd Conference on Magnetism and Magnetic Materials, Tampa, November 5th – 9th 2007

Thermodynamics of itinerant magnets: A simple classical model with longitudinal spin fluctuations
54th Midwest Solid State Conference, Lincoln October 6th – 7th 2007
* Best poster award

First-principles studies of spin disorder resistivity of Fe and Ni
APS March Meeting, Denver, March 9th – 13th 2007

First-principles studies of spin disorder resistivity of Fe and Ni
53rd Midwest Solid State Conference, Kansas City, October 6th – 8th 2006

Aharonov-Bohm effect in quantum rings (invited)
Academy of Agriculture and Technology in Bydgoszcz, Poland, November 2004