

Abdelaghani Laraoui, Assistant Professor
 Department of Mechanical & Materials Engineering
 Department of Physics & Astronomy
 University of Nebraska-Lincoln
 900 N 16th Street, W312 NH, Lincoln, NE 68588
 Email: alaraoui2@unl.edu
 Phone: office : (+1) 402-472-7680 ; Cell : (+1) 347-332-3699
[Research group website](#), [Google Scholar](#), [ORCID](#), [ResearchGate](#)

Summary of Accomplishments

Research Productivity	
Funding Record	
External	Total funds = \$23,876,659 . Laraoui's share: \$2,649,253 Total pending = \$2,205,631 . Laraoui's share: \$441,126
Internal	Total funds = \$4,320,000 . Laraoui's share: \$380,766
Publications / Presentations	
Publications	33 peer-reviewed journal papers published (4 under review). 9 peer-reviewed conference proceedings published.
Presentations	Presented > 100 oral talks (Invited: Gordon conference, SPIE Photonic West, APS Global March Meeting 2025...). Presented 48 posters.
Advised Students	
PhD students/Postdocs	7 Ph.D. students: one graduated in April of 2024, one will graduate in December of 2024, and one will graduate in April of 2025. Supervised two postdocs. One is an Advanced R&D Scientist at Honeywell.
Undergraduate/high school students	Supervised 13 undergraduate students and one high school student at UNL. They presented 9 posters on their research projects.
Teaching and Service	
Courses Taught	MATL 260/360: elements of Materials science (required undergraduate course), 2020 – 2024 MATL 262: elements of Materials science (required undergraduate lab), 2020 – 2024 MATL 492/982: Introduction of Quantum Materials and Technologies (new course developed), 2021 – 2024
Instructor rating	4.23 average over 5.
Service	Served as a reviewer for NSF (2021, 2024), DOE (2023, 2024), Swiss NSF (2024), French ANR (2023); Organized 2024 NRIC conference on diamond quantum sensing; chaired many sessions at APS March Meeting, MME, and at International Conference on Magnetism; Reviewed 61 papers (NPG, AIP, APS, Wiley, Elsevier, etc.)

Section 1: Education and Employment History

Section 1.1 Education History:

- Doctorate (Ph.D.) of Physics, 10/2007, University of Strasbourg Louis Pasteur, France. **Thesis title:** Magnetization dynamics of magnetic nanostructures: Studies performed with femtosecond magneto-optical microscopy, [Thesis](#). Advisor: [Dr. Jean-Yves Bigot](#).
- Master's degree in Condensed Matter Physics, 6/2003, University of Upper Alsace, Mulhouse, France and Institute of Physics and Chemistry of Materials of Strasbourg, Strasbourg, France. **Thesis title:** Elaboration and characterization of magnetic nanoparticles. Advisors: Dr. Jean-Yves Bigot and Dr. Claude Estournès.

Section 1.2 Employment History:

- University of Nebraska-Lincoln (UNL), Lincoln, NE
Assistant Professor at Department of Mechanical & Materials Engineering, 8/2019- Present.
Recommended tenure to Associate Professor.
Associate Faculty at Nebraska Center for Materials & Nanoscience, 8/2019- Present.
Courtesy Faculty Member, Department of Physics and Astronomy, 2/2022- Present.
- University of New Mexico (UNM), Albuquerque, NM
Research Assistant Professor, Center for High Technology Materials and School of Engineering, 9/2016-7/2019. Group of [Prof. Victor Acosta](#).
- CUNY City College of New York, New York, NY
Research Associate, 4/2009-7/2016, Group of [Prof. Carlos Meriles](#).
- University of Kaiserslautern of Technology, Kaiserslautern, Germany
Marie Curie Postdoctoral Fellow, 10/2007-3/2009, Group of [Prof. Burkard Hillebrands](#).

Section 2: Research Accomplishments

Section 2.1 Research Funding Record

Section 2.1.1 Numbered list (in reverse chronological order) of Externally Funded Research Grants. Total funds = **\$23,566,085** (Laraoui's share: **\$2,561,113**)

<i>Project Title</i>	<i>Sponsor</i>	<i>Role (PI or Co-PI)</i>	<i>Dates</i>	<i>Total Amount (no cost share)</i>
1. EPSCoR Research Fellows: NSF: Plasmonic Cavity Nanostructures to Boost Single Photon Emission from Multilayered Hexagonal Boron Nitride	NSF	PI	1/1/2025 -12/31/2026	\$299,999
2. ExpandQISE: Track 1: JSU-UNL Collaboration on Quantum Sensing Research and Education for Minority Participants	NSF- JSU subaward	PI at UNL Co-PI, NSF	10/1/2024 - 9/30/2027	\$800,000
3. ExpandQISE: Track 1: Understanding and controlling decoherence in hybrid spin qubit-magnon systems for advancing education and building workforce in emerging quantum technologies	NSF- WSU subaward	PI at UNL Co-PI, NSF	10/1/2023 -9/30/2026	\$800,000

4. MRI: Acquisition of Optical Access in a Cryogenic Scanning Probe Microscope	NSF	Co-PI, initiator and main contributor of the writing	9/1/2021-8/31/2025	\$358,171
5. RII Track-1: Emergent Quantum Materials and Technologies (EQUATE)	NSF	SI, Focused Research Group 2 leader	6/1/2021 -5/31/2026	\$20,000,000
6. Probing Room-temperature Skyrmions at the Nanoscale using Diamond Quantum Sensors	UNL-MRSEC	PI	10/1/2019 - 10/31/2020	\$50,000
7. Objective-first sorting and time resolved diamond magnetic microscopy of superparamagnetic nanoparticles	NSF	Original PI	8/1/2019 -8/31/2021	\$389,000
8. MRI: acquisition of a Magnetic Property Measurement System (MPMS) to support research and education in the state of New Mexico	NSF	Co-PI	8/1/2018-8/31/2021	\$276,436
9. Sub-cellular studies of immunomagnetic labeling using diamond magnetic microscopy and multiplexed probes.	NIH	Co-Investigator	7/26/2018-7/31/2021	\$592,479

- Title:** EPSCoR Research Fellows: NSF: Plasmonic Cavity Nanostructures to Boost Single Photon Emission from Multilayered Hexagonal Boron Nitride, **Funding Agency:** NSF ([OIA-2429381](#)), **PI:** Abdelghani Laraoui, **Total amount:** \$ 299,999. **Dates:** 1/1/2025-12/31/2026.
- Title:** NSF ExpandQISE: Track 1: JSU-UNL Collaboration on Quantum Sensing Research and Education for Minority Participants, **Funding Agency:** NSF sub-award from Jackson State University (# [2426522](#)), **Dates:** 10/1/2024 - 9/30/2027, **PI:** Paresh C Ray, **Co-PI:** Abdelghani Laraoui, **Total amount:** \$800,000.
- Title:** NSF ExpandQISE: Track 1: Understanding and controlling decoherence in hybrid spin qubit-magnon systems for advancing education and building workforce in emerging quantum technologies, **Funding Agency:** NSF sub-award from Wichita State University ([#2328822](#)), **Dates:** 10/1/2023 - 9/30/2026, **PI:** Kapildeb Ambal, **Co-PIs:** Abdelghani Laraoui, Jian Wang, **Total amount:** \$800,000.
- Title:** MRI: Acquisition of Optical Access in a Cryogenic Scanning Probe Microscope, **Funding Agency:** NSF ([#2216155](#)), **Dates:** 9/1/2022-8/31/2025, **PI:** Christian Binek, **Co-PIs:** Abdelghani Laraoui, Xia Hong, Xiaoshan Xu, **Total amount:** \$358,171 + UNL's cost share of \$153,502 = \$511,673,
- Title:** RII Track-1: Emergent Quantum Materials and Technologies (EQUATE), **Funding Agency:** NSF ([#2044049](#)), **Dates:** 6/1/2021-5/31/2026, **PI:** Matthew Andrews, **Co-PI:** Christian Binek, **Focused Research Group 2 Leader:** Abdelghani Laraoui, **Total amount:** \$20,000,000, **Total amount attributable to me:** \$1,161,571.
- Title:** Probing Room-temperature Skyrmions at the Nanoscale using Diamond Quantum Sensors, **Funding Agency:** NSF ([#1420645](#)) and UNL-MRSEC, **Dates:** 10/1/2019-10/31/2020, **PI:** Abdelghani Laraoui, **Total Amount:** \$50,000.
- Title:** Objective-first sorting and time resolved diamond magnetic microscopy of superparamagnetic nanoparticles, **Funding Agency:** NSF ([#1809800](#)) sub-award from University of New Mexico, **Dates:** 8/1/2018-8/31/2021, **PI:** Abdelghani Laraoui, **Co-PI:** Victor Acosta. **Total amount:** \$389,999.
- Title:** MRI: acquisition of a Magnetic Property Measurement System (MPMS) to support research and education in the state of New Mexico, **Funding Agency:** NSF-MRI [#1828744](#). **Dates:** 7/26/2018-

7/31/2021, **Institution:** University of New Mexico, **PI:** Martin Kirk, Co-PI's: Abdelghani Laraoui, Victor Acosta, Daniel Feezell, Francesca Cavallo, **Sponsor Amount:** \$276,436, **UNM Cot share amount:** \$110,574, **Total amount:** \$387,010.

9. **Title:** Sub-cellular studies of immunomagnetic labeling using diamond magnetic microscopy and multiplexed probes. **Funding Agency:** NIH-NIBIB #1R21EB027405-01, \$592,479, **Dates:** 9/20/2018-6/30/2021. **PI:** Victor Acosta. **Co-Investigator:** Abdelghani Laraoui

Section 2.1.2 Numbered list (in reverse chronological order) of Internally Funded Research Grants. Total funds = **\$4.3M** (PI's part: **\$380,766**)

<i>Project Title</i>	<i>Sponsor</i>	<i>Role (PI or Co-PI)</i>	<i>Dates</i>	<i>Total Amount (do not include UNL cost share)</i>
<i>Quantum Solutions for Energy Challenges: A Collaborative Leap Toward Sustainability</i>	<i>UNL-Grand Challenges</i>	<i>Co-PI</i> <i>PI</i>	<i>9/1/2023-8/31/2024</i> <i>9/1/2024-8/31/2024</i>	<i>\$150,000</i>
<i>Quantum Approaches Addressing Global Threats.</i>	<i>UNL-Grand Challenges</i>	<i>Co-PI</i>	<i>10/1/2023-9/31/2028</i>	<i>\$4,170,000</i>

- Title:** Quantum Solutions for Energy Challenges: A Collaborative Leap towards Sustainability, **Funding Agency:** UNL's Grand Challenges, **Dates:** 9/1/2023-8/31/2025. **PI:** Mohammad Ghashami (9/1/2023 - 8/31/2024), Abdelghani Laraoui (9/1/2024 – 8/31/2025). **Co-PIs:** Arman Roohi, and Sonya Türkman. **Total Amount:** \$150,000.
- Title:** Quantum Approaches Addressing Global Threats., **Funding Agency:** UNL's Grand Challenges, **Dates:** 10/1/2019-10/31/2020 **PI:** Christian Binek, **Co-PIs:** Abdelghani Laraoui, et al. **Total Amount:** \$4.170,000,

Section 2.2 Publication Record

The following subscriptions indicate students/trainees under my direct supervision at UNL.

1: Undergraduate. 1": high school student.

3: Ph.D. student. 3" Visiting Ph.D. student.

4: Postdoctoral researcher.

**: Equal contributions.*

&: corresponding author.

Section 2.2.1 Numbered list (in reverse chronological order) of Peer Reviewed Journal Publications

- Adam Erickson,^{3,*} Qihan Zhang,^{*} Hamed Vakilitaleghani,^{*} Chaozhong Li, Suchit Sarin, Suvechhya Lamichhane,³ Lanxin Jia, Ilja Fescenko, Edward Schwartz, Sy-Hwang Liou, Jeffrey E. Shield, Guozhi Chai, Alexey Kovalev, Sy-Hwang Liou, Jingsheng Chen,[&] and **Abdelghani Laraoui.**[&] Room temperature magnetic skyrmions in gradient-composition engineered CoPt single layers, *ACS Nano* 18 (45), 31261–31273, 2024. DOI: <https://doi.org/10.1021/acsnano.4c10145>.
- Mohammadjavad Dowran,^{4,*} Ufuk Kilic,^{*} Suvechhya Lamichhane,³ Adam Erickson,³ Joshua Barker,¹ Mathias Schubert, Sy-Hwang Liou, Christos Argyropoulos,[&] and Abdelghani Laraoui.[&] Plasmonic Nanocavity to Boost Single Photon Emission from Defects in Thin Hexagonal Boron Nitride, *Laser & Photonics Reviews* 2400705, 2024. DOI: <https://doi.org/10.1002/lpor.202400705>.
- Suvechhya Lamichhane,³ Evelyn Carreto Guevara, Ilja Fescenko, Sy-Hwang Liou, Rebecca Y. Lai, and Abdelghani Laraoui.[&] Magnetic Relaxometry of Hemoglobin by Widefield Nitrogen-Vacancy Microscopy, *Applied Physics Letters* 125, 114002, 2024. DOI: <https://doi.org/10.1063/5.0217987>.

4. Adam Erickson,³ Syed Qamar Abbas Shah, Ather Mahmood, Pratyush Buragohain, Ilja Fescenko, Alexei Gruverman, Christian Binek,[&] **Abdelghani Laraoui**.[&] Imaging Local Effects of Voltage and Boron Doping on Spin Reversal in Antiferromagnetic Magnetolectric Cr₂O₃ Thin Films and Devices, *Advanced Functional Materials* 2408542, 2024, DOI: <https://doi.org/10.1002/adfm.202408542>. The paper is highlighted by [Nebraska Today](#), [Phys.org](#), [UNL's College of Engineering](#), etc.
5. Rupak Timalisina,³ Bharat Giri, Haohan Haohan, Adam Erickson,³ Suchit Sarin, Suvechhya Lamichhane,³ Sy-Hwang Liou, Jeffrey Shield, Xiaoshan Xu, **Abdelghani Laraoui**.[&] Effect of substrate on spin-wave propagation properties in ferrimagnetic thulium iron garnet thin films, *Advanced Electronic Materials* 2400398, 2024. DOI: <https://doi.org/10.1002/aelm.202400398>.
6. Suvechhya Lamichhane,³ Rupak Timalisina,³ Cody Schultz, Ilja Fescenko, Kapildeb Ambal, Sy-Hwang Liou, Rebecca Y. Lai, and **Abdelghani Laraoui**.[&] Nitrogen-Vacancy Magnetic Relaxometry of Nanoclustered Cytochrome C Proteins, *Nano Letters* 24, 3, 873–880, 2024. DOI: <https://doi.org/10.1021/acs.nanolett.3c03843>.
7. Rupak Timalisina,³ Haohan Wang, Bharat Giri, Adam Erickson,³ Xiaoshan Xu, and **Abdelghani Laraoui**.[&] Mapping of Spin-Wave Transport in Thulium Iron Garnet Thin Films Using Diamond Quantum Microscopy, *Advanced Electronic Materials*, 2300648, 2023. DOI: <https://doi.org/10.1002/aelm.202300648>.
8. L. Khosravi Khorashad, A. Reicks, A. Erickson,³ J. E. Shield, D. Alexander, **A. Laraoui**, G. Gogos, C. Zuhlke, and C. Argyropoulos.[&] Unraveling the formation dynamics of metallic femtosecond laser induced periodic surface structures, *Optics & Laser Technology* 171, 110410, 2024. DOI: <https://doi.org/10.1016/j.optlastec.2023.110410>.
9. Suvechhya Lamichhane,³ Kayleigh A McElveen, Adam Erickson,³ Ilja Fescenko, Shuo Sun, Rupak Timalisina,³ Yinsheng Guo, Sy-Hwang Liou, Rebecca Y. Lai, and **Abdelghani Laraoui**.[&] Nitrogen-vacancy magnetometry of individual Fe-triazole spin crossover nanorods, *ACS Nano* 17, 9, 8694–8704, 2023. DOI: <https://doi.org/10.1021/acsnano.3c01819>. In the News: [Nebraska Today](#), [Physics Today](#).
10. Mohammadjavad Dowran,⁴ Andrew Butler, Suvechhya Lamichhane,³ Adam Erickson,³ Ufuk Kilic, Sy-Hwang Liou, Christos Argyropoulos, and **Abdelghani Laraoui**.[&] Plasmon Enhanced Single Photon Emitters with Hybrid Hexagonal Boron Nitride Silver Nanocube Systems, *Advanced Optical Materials* 2300392, 2023. DOI: <https://doi.org/10.1002/adom.202300392>. In the News: [Nebraska Today](#), [Physics Today](#), and [Nebraska EPSCoR](#). Selected for back outside cover at *Advanced Optical Materials*.
11. Prem Bahadur Karki,^{*} Rupak Timalisina,^{3,*} Mohammadjavad Dowran,⁴ Ayodimeji E. Aregbesola, **Abdelghani Laraoui**,[&] and Kapildeb Ambal.[&] An efficient method to create high-density nitrogen-vacancy centers in CVD diamond for sensing applications, *Diamond and Related Materials*, Volume 140, Part B, 110472, 2023. DOI: <https://doi.org/10.1016/j.diamond.2023.110472>.
12. Adam Erickson,³ Syed Qamar Abbas Shah, Ather Mahmood, Ilja Fescenko, Rupak Timalisina,³ Christian Binek,[&] **Abdelghani Laraoui**.[&] Nanoscale imaging of antiferromagnetic domains in epitaxial films of Cr₂O₃ via scanning diamond magnetic probe microscopy, *RSC Advances* 13 (1), 178-185, 2023. DOI: <https://doi.org/10.1039/D2RA06440E>.
13. **Abdelghani Laraoui**[&] and Kapildeb Ambal. Opportunities for nitrogen-vacancy-assisted magnetometry to study magnetism in 2D van der Waals magnets, *Applied Physics Letters* 121, 060502 (2022). DOI: <https://doi.org/10.1063/5.0091931>.
14. J. Smits, J. Damron, P. Kehayias, N. Mosavian, I. Fescenko, A. McDowell, **A. Laraoui**, A. Jarmola, V. M. Acosta.[&] Sub-Hertz two-dimensional NMR spectroscopy of molecules using Nitrogen Vacancy centers in diamond, *Science Advances* 5 eaaw7895, 2019. DOI: <https://doi.org/10.1126/sciadv.aaw7895>.

15. I. Fescenko, **A. Laraoui**, J. Smits, N. Mosavian, P. Kehayias, J. Seto, L. Bougas, A. Jarmola, V. M. Acosta.& Diamond magnetic microscopy of malarial hemozoin nanocrystals, *Physics Review Applied* **11**, 034029, 2019. DOI: <https://doi.org/10.1103/PhysRevApplied.11.034029>.
16. D. Kikuchi, D. Prananto, K. Hayashi, **A. Laraoui**, N. Mizuochi, M. Hatano, E. Saitoh, Y. Kim, C.A. Meriles, T. An.& Long-distance excitation of nitrogen-vacancy centers in diamond via surface spin waves, *Applied Physics Express*, **10** 103004, 2017. DOI: <https://doi.org/10.7567/APEX.10.103004>.
17. P. Kehayias, A. Jarmola, N. Mosavian, I. Fescenko, F. M. Benito, **A. Laraoui**, J. Smits, L. Bougas, D. Budker, A. Neumann, S. R. J. Brueck, V. M. Acosta.& Solution nuclear magnetic resonance spectroscopy on a nanostructured diamond chip, *Nature Communications* **8**, 108, 2017. DOI: <https://doi.org/10.1038/s41467-017-00266-4>.
18. H. Jayakumar, J. Henshaw, S. Dhomkar, D. Pagliero, **A. Laraoui**, N. Manson, R. Albu, M. W. Doherty, C. A. Meriles.& Optical patterning of trapped charge in nitrogen-doped diamond, *Nature Communications* **7**, 12660, 2016. DOI: <https://doi.org/10.1038/ncomms12660>.
19. **A. Laraoui**, H. Aycock-Rizzo, X. Lu, Y. Gao, E. Riedo, C. A. Meriles.& Imaging thermal conductivity with nanoscale resolution using a scanning spin probe, *Nature Communications* **6**, 8954, 2015. DOI: <https://doi.org/10.1038/ncomms9954>.
20. **A. Laraoui**, D. Pagliero, C. A. Meriles.& Imaging nuclear spins weakly coupled to a probe paramagnetic center, *Physical Review B* **91**, 205410, 2015. DOI: <https://doi.org/10.1103/PhysRevB.91.205410>.
21. D. Pagliero, **A. Laraoui**, J. Henshaw, C. A. Meriles.& Recursive polarization of nuclear spins in diamond at arbitrary magnetic fields, *Applied Physics Letters* **105**, 242402, 2014. DOI: <https://doi.org/10.1063/1.4903799>.
22. M. E. Trusheim, L. Li, **A. Laraoui**, E.H. Chen, O. Gaathon, H. Bakhru, T. Schroeder, C. A. Meriles, D. Englund.& Scalable Fabrication of High Purity Diamond Nanocrystals with Long-Spin-Coherence Nitrogen Vacancy Centers, *Nano Letters*, **14** (1), 32-36, 2014. DOI: <https://doi.org/10.1021/nl402799u>. In the News: [NanoTechWeb](#), [PhysicsWorld](#), [Nature News Feature](#).
23. **A. Laraoui**, C. A. Meriles.& Approach to dark spin cooling in a diamond nanocrystal, *ACS Nano* **7**, 3403, 2013. DOI: <https://doi.org/10.1021/nn400239n>.
24. **A. Laraoui**, F. Dolde, C. Burk, F. Reinhard, J. Wrachtrup, C. A. Meriles.& High-Resolution Correlation Spectroscopy of ¹³C Spins Near a Nitrogen-Vacancy Center in Diamond, *Nature Communications* **4**, 1651, 2013. DOI: <https://doi.org/10.1038/ncomms2685>.
25. **A. Laraoui**, J. S. Hodges, C. A. Meriles.& Nitrogen-Vacancy-assisted magnetometry of paramagnetic centers in an individual diamond nanocrystal, *Nano Letters* **12** (7), 3477–348, 2012. DOI: <https://doi.org/10.1021/nl300964g>.
26. **A. Laraoui**, C. A. Meriles.& Rotating frame spin dynamics of a Nitrogen-Vacancy center in a diamond nanocrystal, *Physical Review B* **84**, 161403(Rapid Communications), 2011. DOI: <https://doi.org/10.1103/PhysRevB.84.161403>.
27. **A. Laraoui**, J. S. Hodges, C. Ryan, C. A. Meriles.& The diamond nitrogen-vacancy center as a probe of random fluctuations in a spin ensemble, *Physical Review B* **84**, 104301 (2011). DOI: <https://doi.org/10.1103/PhysRevB.84.104301>.
28. **A. Laraoui**, J. S. Hodges, C. A. Meriles.& Magnetometry of random ac magnetic fields using a single nitrogen-vacancy center in diamond, *Applied Physics Letters* **97**, 143104, 2010. The Virtual Journal of Nanoscale Science and Technology **22**, 16 (October 2010). DOI: <https://doi.org/10.1063/1.3497004>.
29. H. Schultheiss,& X. Janssens, M. van Kampen, F. Ciubotaru, S. J. Hermsdoerfer, B. Obry, **A. Laraoui**,& A. A. Serga, L. Lagae, A. N. Slavin, B. Leven, and B. Hillebrands. Direct Current Control of Three

- Magnon Scattering Processes in Spin-Valve Nanocontacts, *Physical Review Letters* 103, 157202, 2009. The Virtual Journal of Nanoscale Science and Technology 20, 16 (October 2009).
DOI: <https://doi.org/10.1103/PhysRevLett.103.157202>.
30. A. Laraoui, J. Vénuat, V. Halté, M. Albrecht, E. Beaurepaire, J.-Y. Bigot.& Study of individual ferromagnetic discs with femtosecond optical pulses, *Journal of Applied Physics* 101, 09C105, 2007. DOI: <https://doi.org/10.1063/1.2711609>.
 31. A. Laraoui, M. Albrecht, J.-Y. Bigot.& Femtosecond Magneto-optical Kerr Microscopy, *Optics Letters* 32, 936, 2007. The Virtual Journal of Ultrafast Science 6, 4 (April 2007). DOI: <https://doi.org/10.1364/OL.32.000936>.
 32. A. Laraoui, V. Halté, M. Vomir, J. Vénuat, M. Albrecht, E. Beaurepaire, J.-Y. Bigot.& Ultrafast spin dynamics of an individual CoPt3 ferromagnetic dot, *The European Physical Journal D* 43, 253, 2007. DOI: <https://doi.org/10.1140/epjd/e2007-00120-y>.
 33. L. H. F. Andrade, A. Laraoui, M. Vomir, D. Muller, J.-P. Stoquert, C. Estournès, E. Beaurepaire, J.-Y. Bigot.& Damped Precession of the Magnetization Vector of Superparamagnetic Nanoparticles Excited by Femtosecond Optical Pulses, *Physical Review Letters* 97, 127401, 2006. The Virtual Journal of Nanoscale Science and Technology 5, 10 (October 2006). DOI: <https://doi.org/10.1103/PhysRevLett.97.127401>.

Section 2.2.2 Numbered list (in reverse chronological order) of Peer Reviewed Journal Publications submitted for review.

1. B. Richards, N. Ristoff, J. Smits, A. Jeronimo Perez, I. Fescenko, M. D. Aiello, F. Hubert, Y. Silani, N. Mosavian, M. Saleh Ziabari, A. Berzins, J. T. Damron, P. Kehayias, D. L. Huber, A. M. Mounce, M. P. Lilly, T. Karaulanov, A. Jarmola, A. Laraoui,& and V. M. Acosta.& Time-resolved diamond magnetic microscopy of superparamagnetic iron-oxide nanoparticles, *ACS Nano*, under review. A preprint is posted on [arXiv](https://arxiv.org/).
2. Bharat Giri, Ahsan Ullah, Jing Li,¹ Bjorn Josteinsson, Zhewen Xu, Suvechhya Lamichhane,³ Adam Erickson,³ Gabriel Puebla Hellmann, **Abdelghani Laraoui**, Sy-Hwang Liou, Xiaoshan Xu.& Giant topological Hall effect as evidence of small skyrmions above room temperature in Pt/NiCo₂O₄ heterostructure, *Advanced Functional Materials*, recommended after minor revisions, submitted on August 18, 2024.
3. Raman Kumar,* Thitinun Gas-osoith,^{3,*} Yifei Wang,^{3,*} Ilja Fescenko, Adam Erickson,³ Suvechhya Lamichhane, Tom Delord, Tianlin Li, Nina Raghavan, Cory Cress, Nicholas Proscia, Samuel W. LaGasse, Sy-Hwang Liou, Xia Hong, Toshu An, Jose Fonesca Vega, Carlos Meriles,& and **Abdelghani Laraoui**.& Nitrogen-vacancy Magnetometry of Weak Ferromagnetism in WS₂ Flakes, *Small*, under review.
4. Adam Erickson,^{3,*} Qihan Zhang,* Hamed Vakilitaleghani,* Chaozhong Li, Suvechhya Lamichhane,³ Lanxin Jia, Edward Schwartz, Sy-Hwang Liou, Guozhi Chai, Alexey Kovalev, Sy-Hwang Liou, Jingshen Chen,& and **Abdelghani Laraoui**.& Effect of thickness and g-DMI on topological spin textures in CoPt single layers, *Nano Letters*, under review.
5. Ufuk Kilic, Christos Argyropoulos,& and **Abdelghani Laraoui**.& Effect of Plasmonic Nanocavity on the quantum properties of Single Photon Emitters in Ultrathin Hexagonal Boron Nitride, *ACS Photonics*, under review.

Section 2.2.3 Numbered list (in reverse chronological order) of Conference Proceedings: Peer reviewed extended abstract or peer reviewed papers

1. P. B. Karki, R. Timalina,³ M. Dowran,⁴ A. E. Aregbesola, **A. Laraoui**[&] and K. Ambal.[&] Creation of High-Density Nitrogen-Vacancy Centers in CVD Diamond using High-Energy Photons from Ar⁺ Plasma, in CLEO 2024, Technical Digest Series (Optica Publishing Group, 2024), paper JW2A.92. Link: https://opg.optica.org/abstract.cfm?URI=CLEO_AT-2024-JW2A.92.
2. Suvechhya Lamichhane,³ Cody Schultz, Rupak Timalina,³ Ilja Fescenko, Kapildeb Ambal, Sy-Hwang Liou, Rebecca Y. Lai, **Abdelghani Laraoui**.[&] Magnetic sensing of iron in cytochrome C using diamond quantum sensors. Proceedings Volume PC12863, Quantum Effects and Measurement Techniques in Biology and Biophotonics; PC128630P (2024). DOI : <https://doi.org/10.1117/12.3003909>.
3. J. Smits,[&] J. Damron, P. Kehayias, A. Mcdowell, N. Mosavian, I. Fescenko, N.Ristoff, **A. Laraoui**, A. Jarmola, V. Acosta. Chemical resolution picolitre NMR with a Nitrogen-Vacancy diamond quantum sensor Symposium Latsis 2019 on *Diamond Photonics - Physics, Technologies and Applications* OSA Technical Digest (Optical Society of America), paper 62, 2019.
4. I. Fescenko,^{*,&} **A Laraoui**,^{*} J Smits, N Mosavian, P Kehayias, J Seto, L Bougas, A. Jarmola, V. M. Acosta. Magnetic imaging of malarial nanocrystals with diamond sensors, Laser Science, JW3A.89 (2019), *The Optical Society of America*, 2019.
5. J.-Y. Bigot, M. Vomir, M. Barthélémy, M. Albrecht, **A. Laraoui**.[&] Nanophotonics devices based on magnetic materials, *Proc. SPIE* 8268, 82682U, 2012.
6. J.-Y. Bigot,[&] **A. Laraoui**, M, Vomir, M. Albrecht. Magneto-optical pump probe imaging, *Proc. IEEE* in Lasers and Electro-Optics, ISBN: 978-1-55752-859-9 (2008).
7. **A. Laraoui**,[&] V. Halté, L. Andrade, J.-Y. Bigot. Ultrafast magnetization dynamics in cobalt nanoparticles studied with femtosecond laser pulses, *Proc. IEEE* in Lasers and Electro-Optics, ISBN: 978-1-55752-859-9 (2008).
8. J.-Y. Bigot, **A. Laraoui**, J. Vénuat, M. Vomir, E. Beaurepaire, Time resolved magneto-optical microscopy of individual ferromagnetic dots, *Springer Verlag series in Chemical Physics* 88, 662 (2007).
9. **A. Laraoui**,[&] M. Vomir, E. Beaurepaire, J.-Y. Bigot. Femtosecond imaging of the spin dynamics of CoPt nanostructures, *Proc. IEEE* in International Quantum Electronics Conference, ISBN: 978-1-4244-0931-0 (2007).

Section 2.2.4 Numbered list (in reverse chronological order) of Conference Presentations: underlined is the presenting author

1. Rupak Timalina,³ Haohan Wang, Bharat Giri, Adam Erickson,³ Xiaoshan Xu, and **Abdelghani Laraoui**. Study of Spin-Wave Transport Properties in Thin Thulium Iron Garnet Films Grown on GGG and sGGG Substrates, MMM-Intermag 2025, January 13-17, 2025, New Orleans, LA.
2. Adam Erickson,³ Qihan Zhang, Hamed Vakili, Ilja Fescenko, Edward Schwartz, Suvechhya Lamichhane,³ Sy-Hwang Liou, Alexey Kovalev, Jingsheng Chen, and **Abdelghani Laraoui**. Direct Imaging of Room Temperature Magnetic Skyrmions in Gradient-DMI Engineered CoPt Single Layers, MMM-Intermag 2025, January 13-17, 2025, New Orleans, LA.
3. **Abdelghani Laraoui**, Mohammadjavad Dowran,⁴ Ufuk Kilic, Suvechhya Lamichhane,³ Adam Erickson,³ Sy-Hwang Liou, Christos Argyropoulos. Enhanced Quantum Properties of Single Photon Emitters in Hexagonal Boron Nitride Flakes Using Plasmonic Nanocavities, 2024 MRS Spring Meeting, April 22-26, 2024, Seattle, WA.

4. Thitinun Gas-osoth,^{3,*} Yifei Wang,^{3,*} Suvechhya Lamichhane,³ Raman Kumar, Tianlin Li, Tom Delord, Cory Cress, Jose Fonesca Vega, Xia Hong, Toshu An, Carlos Meriles, and **Abdelghani Laraoui**. Widefield Nitrogen-Vacancy Magnetometry of Pristine and Fe-implanted WS₂, The 71st Japan Society of Applied Physics (JSAP) Spring Meeting 2024, March 22 – 25 , 2024, Venue Setagaya Campus, Tokyo City University, Japan.
5. Adam Erickson,³ Ather Mahmood, S.Q.A Shah, Ilja Fescenko, Christian Binek, and **Abdelghani Laraoui**. Studying the effect of boron doping and thickness on antiferromagnetic domains in epitaxial B-Cr₂O₃ films using diamond scanning probe microscopy, APS March Meeting March 3-8, 2024, Minneapolis, MN.
6. Adam Erickson,³ Qihan Zhang, Hamed Vakili, Ilja Fescenko, Edward Schwartz, Suvechhya Lamichhane,³ Sy-Hwang Liou, Alexey Kovalev, Jingsheng Chen, and **Abdelghani Laraoui**. Room temperature direct imaging of topological spin textures in gradient-DMI engineered CoPt single layer, APS March Meeting March 3-8, 2024, Minneapolis, MN.
7. Suvechhya Lamichhane,³ Rupak Timalisina,³ Cody Schultz, Ilja Fescenko, Kapildeb Ambal, Sy-Hwang Liou, Rebecca Lai, and **Abdelghani Laraoui**. Magnetic relaxometry study of cytochrome C using nitrogen vacancy centers in diamond, APS March Meeting March 3-8, 2024, Minneapolis, MN.
8. Rupak Timalisina,³ Haohan Wang, Bharat Giri, Adam Erickson,³ Xiaoshan Xu, and **Abdelghani Laraoui**. Study of spin-wave propagation properties in ferrimagnetic insulator TmIG thin films, APS March Meeting March 3-8, 2024, Minneapolis, MN.
9. **Abdelghani Laraoui**, Thitinun Gas-osoth,^{3*} Yifei Wang,^{3*} Raman Kumar, Tom Delord, Adam Erickson,³ Tianlin Li, Cory Cress, Jose Fonseca-Vega, Xia Hong, Toshu An, Carlos Meriles, Suvechhya Lamichhane,¹ Sy-Hwang Liou. Ferromagnetism and magnetic edge effects in Fe-implanted WS₂ layers, APS March Meeting March 3-8, 2024, Minneapolis, MN.
10. Suvechhya Lamichhane,³ Cody Slutz, Rupak Timalisina,³ Ilja Fescenko, Kapildeb Ambal, Sy-Hwang Liou, Rebecca Y. Lai, and **Abdelghani Laraoui**. Magnetic sensing of iron in Cytochrome C using diamond nitrogen-vacancy magnetometry, SPIE Photonics West 2024, January 29- February 2, 2024, San Francisco, CA.
11. Rupak Timalisina,³ Haohan Wang, Bharat Giri, Adam Erickson,³ Xiaoshan Xu, and **Abdelghani Laraoui**. Diamond Magnetic Resonance Imaging of Coherent Spin Waves in Ferrimagnetic TmIG Thin Films. The 68th Annual Conference on Magnetism and Magnetic Materials (MMM), October 30 -November 3, 2023, Dallas, TX.
12. Suvechhya Lamichhane,³ Kayleigh A McElveen, Adam Erickson,³ Ilja Fescenko, Shuo Sun, Rupak Timalisina,³ Yinsheng Guo, Sy-Hwang Liou, Rebecca Y. Lai, and **Abdelghani Laraoui**. Magnetic Imaging of Individual Nanoparticles Using Nitrogen-Vacancy Microscopy. The 68th Annual Conference on Magnetism and Magnetic Materials (MMM), October 30 -November 3, 2023, Dallas, TX.
13. Mohammadjavad Dowran,⁴ Suvechhya Lamichhane,³ Adam Erickson,³ Andrew Butler, Sy-Hwang Liou, Christos Argyropoulos, **Abdelghani Laraoui**. Plasmon enhanced quantum properties of single photon emitters in hexagonal boron nitride flakes, MRS Spring Meeting, April 10-14, 2023, San Francisco, CA.
14. **Abdelghani Laraoui**, Mohammadjavad Dowran,⁴ Suvechhya Lamichhane,³ Adam Erickson,³ Andrew Butler, Sy-Hwang Liou, Christos Argyropoulos. Enhancement of Single Photon Emitters in hexagonal boron nitride multilayered flakes Via Plasmonic Resonance in metallic nanostructures, APS March Meeting March 5-10, 2023, Las Vegas, NV.
15. **Abdelghani Laraoui**, Adam Erickson,³ Ather Mahmood, Syed Qamar Abbas Shah, Ilja Fescenko, Rupak Timalisina,³ Christian Binek. Imaging voltage controlled antiferromagnetic domains' switching

in B doped Cr₂O₃ epitaxial films using nitrogen-vacancy scanning microscopy, APS March Meeting March 5-10, 2023, Las Vegas, NV.

16. Suvechhya Lamichhane,³ Kayleigh McElveen, Adam Erickson,³ Shuo Sun, Rupak Timalina,³ Yinsheng Guo, Rebecca Lai, Sy-Hwang Liou, **Abdelghani Laraoui**. Studying spin states of single nano-rods of [Fe(Htrz)₂(trz)](BF₄) spin-crossover molecules using diamond quantum sensing microscopy, APS March Meeting March 5-10, 2023, Las Vegas, NV.
17. Adam Erickson,³ Ather Mahmood, Syed Qamar Abbas Shah, Ilja Fescenko, Rupak Timalina,³ Christian Binek, **Abdelghani Laraoui**. Studying the effect of boron doping and temperature on antiferromagnetic domains in epitaxial Cr₂O₃ films using diamond magnetometry, APS March Meeting March 5-10, 2023, Las Vegas, NV.
18. Rupak Timalina,³ Haohan Wang, Adam Erickson,³ Bharat Giri, Xiaoshan Xu, **Abdelghani Laraoui**. Excitation and detection of spin waves in rare-earth garnet insulator TmIG films using diamond nitrogen vacancy magnetometry, APS March Meeting March 5-10, 2023, Las Vegas, NV.
19. **Abdelghani Laraoui**, Rupak Timalina,³ Cody M. Schultz, Suvechhya Lamichhane,³ Adam Erickson,³ Sy-Hwang Liou, Rebecca Y. Lai. Magnetic imaging of iron in biomolecules using diamond quantum sensors, MRS Spring Meeting, May 23-25, 2022, Honolulu HI.
20. Bryan Richards, Nate Ristoff, Abdelghani Laraoui, Ilja Fescenko, Joshua Damron, Nazanin Mosavian, Janis Smits, Andrey Jarmola, Pauli Kehayias, Maziar Saleh Ziabari, Andrew Mounce, Dale Huber, Victor Acosta. Imaging Néel Relaxation of Superparamagnetic Nanoparticles using Diamond Magnetic Microscopy, March 14–18, 2022; Chicago, IL.
21. Adam Erickson,³ Ather Mahmood, Syed Qamar Abbas Shah, Rupak Timalina,³ Christian Binek, **Abdelghani Laraoui**. Nanoscale imaging of antiferromagnetic domains in epitaxial Cr₂O₃ films using diamond quantum sensing microscopy, March 14–18, 2022; Chicago, IL.
22. Rupak Timalina,³ Cody Schultz, Suvechhya Lamichhane,³ Adam Erickson,³ Sy-Hwang Liou, Rebecca Lai, **Abdelghani Laraoui**. Magnetic sensing of iron in biomolecules using diamond nitrogen vacancy centers, APS March Meeting, March 14–18, 2022; Chicago, IL.
23. R. Skomski, D. Paudyal, B. Balasubramanian, A. Ullah, **A. Laraoui**, and D. J. Sellmyer, Exchange Interactions in Mixed-Rare-Earth Transition-Metal Compounds, 2022 Joint MMM-Intermag Conference, January 10-14, 2022, New Orleans, LA.
24. A. Erickson,³ W. K. Chin,³ R. Timalina,³ and **A. Laraoui**. Nitrogen Vacancy Magnetic Microscopy of Spin Textures in Magnetic Nanomaterials, MRS Fall Meeting (virtual), December 6–8, 2021.
25. N. Ristoff, **A. Laraoui**, I. Fescenko, J. Damron, N. Mosavian, J. Smits, A. Jarmola, P. Kehayias, M. Salehziabari, A. Mounce, D. Huber, V. Acosta. Time-resolved diamond magnetic microscopy of superparamagnetic nanoparticles, APS March Meeting, March 2–6, 2020, Denver, CO.
26. **A. Laraoui**, I. Fescenko, J. Smits, N. Mosavian, P. Kehayias, A. Jarmola, V. Acosta. Studying static and dynamic magnetic properties of individual 22.6-nm superparamagnetic nanoparticles using diamond magnetic microscopy, APS March Meeting, March 4–8, 2019; Boston, MA.
27. J. Smits, A. Jarmola, L. Bougas, N. Mosavian, I. Fescenko, P. Kehayias, **A. Laraoui**, V. Acosta. Microscale nuclear magnetic resonance imaging with diamond chips, APS March Meeting, March 5–9, 2018; Los Angeles, CA.
28. P. Kehayias, A. Jarmola, N. Mosavian, I. Fescenko, F. Benito, **A. Laraoui**, J. Smits, L. Bougas, D. Budker, A. Neumann, S. Brueck, V. Acosta. Picoliter NMR spectroscopy using nitrogen-vacancy centers in nanofabricated diamond, 48th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, June 5–9, 2017, Sacramento, CA.

29. S. Dhomkar, H. Jayakumar, D. Pagliero, A. Laraoui, R. Albu, N. Manson, M. Doherty, J. Henshaw, C.A. Meriles. Optical patterning of trapped charge in nitrogen-doped diamond, , APS March Meeting March 14–18, 2016; Baltimore, MD.
30. A. Laraoui, D. Pagliero, C.A. Meriles. Structure determination of individual electron-nuclear spin complexes in a solid-state matrix, APS March Meeting, March 2–6, 2015; San Antonio, Texas.
31. D. Pagliero, A. Laraoui, J. Henshaw, C.A. Meriles. Recursive polarization of nuclear spins in diamond at arbitrary magnetic field APS March Meeting, March 2–6, 2015; San Antonio, Texas.
32. A. Laraoui, F. Dolde, C. Burk, J. Wrachtrup, F. Reinhard, C.A. Meriles. High-resolution correlation spectroscopy of ^{13}C spins near a nitrogen-vacancy center in diamond, APS March Meeting, March 18 - 22, 2013, Baltimore, MD.
33. A. Laraoui, C.A. Meriles. Spin Sensing of Paramagnetic Centers in an Individual Diamond Nanocrystal, MRS Fall meeting, November 25-30, 2012, Boston, MA.
34. C. A. Meriles, A. Laraoui, J. S. Hodges. Nitrogen-Vacancy-assisted magnetometry of paramagnetic centers in an individual diamond nanocrystal, 4th Nano-MRI Conference, July 22-27, 2012, Monte Verita, Switzerland.
35. A. Laraoui, C.A. Meriles. Spin dynamics of Nitrogen-Vacancy centers in a diamond nanocrystal, APS March Meeting, February 27 - March 2, 2012, Boston, MA.
36. H. Schultheiss, A. Laraoui, F. Ciubotaru, M. Manfrini, M. van Kampen, L. Lagae, A. N. Slavin, B. Leven, B. Hillebrands. Spin-wave radiation and dc current controlled three-magnon-scattering efficiency in a spin-torque nanocontact device, The first international workshop on Magnetic Single Nano-Objects, November 26-28, 2008, Nancy, France.
37. H. Schultheiss, A. Laraoui, F. Ciubotaru, M. Manfrini, M. van Kampen, L. Lagae, A. N. Slavin, B. Leven, B. Hillebrands. DC current controlled three magnons scattering efficiency in spin torque nano-oscillators, Spin momentum transfer workshop, October 3-5, 2008, Krakow, Poland.
38. M. Vomir, A. Laraoui, V. Halté, M. Albrecht, E. Beaurepaire, J.-Y. Bigot. Ultrafast magnetization dynamics of magnetic films and nanostructures, Nano science Grand East Meeting: spintronics and nanomagnetism, Oct 2007, Strasbourg, France.
39. V. Halté, A. Laraoui, L.H.F. Andrade, M. Vomir, J.-Y. Bigot. Damped precession of the magnetization in cobalt nanoparticles induced by femtosecond laser pulses, FCILA 2007, June 4-7, 2007, Lyon, France.
40. A. Laraoui, J.-Y. Bigot. Ultrafast magneto-optical Kerr microscopy: Spin dynamics in individual ferromagnetic dots, 11th Louis Néel Colloquium, March 11-16, 2007, Lyon, France.
41. J.-Y. Bigot, A. Laraoui, J. Vénuat, M. Vomir, E. Beaurepaire. Time resolved magneto-optical microscopy of individual ferromagnetic dots, 15th International Conference Ultrafast Phenomena, July 30, - August 4, 2006, Pacific Grove/CA.

Section 2.2.5 Numbered list (in reverse chronological order) of Posters: underlined is the presenting author

1. Adam Erickson,³ Ather Mahmood, Syed Qamar Abbas Shah, Ilja Fescenko, Rupak Timalina,³ Christian Binek, Abdelghani Laraoui. Boron Doping and Voltage Effects on Spin Reversal of Antiferromagnetic Domains in Cr_2O_3 Thin Films and Devices, MMM-Intermag 2025, January 13-17, 2025, New Orleans, LA.
2. Abdelghani Laraoui. Quantum Sensing with Nitrogen Vacancy Centers in Diamond, NSF-EPSCoR Conference, October 13-15, 2024, Omaha, NE.

3. Ben Hammons,¹ Rupak Timalisina,³ Yuanyuan Zhang, Adam Erickson,³ Tianlin Li, Xia Hong, and **Abdelghani Laraoui**. Nitrogen Vacancy Microscopy at Cryogenic Temperatures, NSF-EPSCoR Conference, October 13-15, 2024, Omaha, NE.
4. Suvechhya Lamichhane,³ Evelyn Carreto Guevara, Ilja Fescenko, Sy-Hwang Liou, Rebecca Lai, and **Abdelghani Laraoui**. Magnetic Relaxometry of Iron Containing Biomolecules by Widefield Nitrogen-Vacancy Microscopy, NSF-EPSCoR Conference, October 13-15, 2024, Omaha, NE.
5. Adam Erickson,³ Qihan Zhang, Hamed Vakilitaleghani, Suvechhya Lamichhane,³ Ilja Fescenko, Edward Schwartz, Alexey Kovalev, Sy-Hwang Liou, Jingshen Chen, and **Abdelghani Laraoui**. Mapping Bloch Skyrmions and Anti-Skyrmion-Skyrmion Pairs in Broken Inversion Symmetry CoPt Gradient Thin Films, NSF-EPSCoR Conference, October 13-15, 2024, Omaha, NE.
6. Mason Brady,¹ **Abdelghani Laraoui**. Characterization and Control of Single-Photon Emitters' Properties in Hexagonal Boron Nitride, UNL's Lincoln Summer Research Fair, August 6, 2024.
7. Dylan Jacks,¹ Benjamin Hammons,¹ **Abdelghani Laraoui**. Cryogenic Quantum Diamond Sensing Microscopy of Magnetic Materials. UNL's Lincoln Summer Research Fair, August 6, 2024.
8. Adam Erickson,³ Qihan Zhang, Hamed Vakilitaleghani, Suvechhya Lamichhane,³ Ilja Fescenko, Edward Schwartz, Alexey Kovalev, Sy-Hwang Liou, Jingshen Chen, and **Abdelghani Laraoui**. Mapping Bloch Skyrmions and Anti-Skyrmion-Skyrmion Pairs in Broken Inversion Symmetry CoPt Gradient Thin Films, NRIC 2024 Conference on diamond quantum sensing: challenge and opportunities, March 14, 2024, Lincoln, NE.
9. Suvechhya Lamichhane,³ Rupak Timalisina,³ Cody Schultz, Adam Erickson,³ Ilja Fescenko, Kapildeb Ambal, Sy-Hwang Liou, Rebecca Lai, and **Abdelghani Laraoui**. Diamond quantum sensing microscopy of cytochrome C molecules, NRIC 2024 Conference on diamond quantum sensing: challenge and opportunities, March 14, 2024, Lincoln, NE.
10. Rupak Timalisina,³ Haohan Wang, Bharat Giri, Adam Erickson,³ Xiaoshan Xu, and **Abdelghani Laraoui**. Mapping spin-wave transport in ferrimagnetic insulator TmIG thin films, NRIC 2024 Conference on diamond quantum sensing: challenge and opportunities, March 14, 2024, Lincoln, NE.
11. Ben Hammons,¹ Rupak Timalisina,³ and **Abdelghani Laraoui**. Cryogenic Nitrogen Vacancy Widefield Microscopy, Magnetic Resonance Measurements, UNL's Lincoln Summer Research Fair, August 3, 2023.
12. Enrique Stolz,¹ Rupak Timalisina,³ Ben Hammons,¹ and **Abdelghani Laraoui**. Application of Nitrogen Vacancy Centers in Spin wave Imaging, UNL's Lincoln Summer Research Fair, August 3, 2023.
13. Mauricio Velasco,¹ Suvechhya Lamichhane,³ and **Abdelghani Laraoui**. Properties Of Nanoparticles on Hematite and Magnetite, UNL's Lincoln Summer Research Fair, August 3, 2023.
14. Rupak Timalisina,³ Haohan Wang, Adam Erickson,³ Bharat Giri, Xiaoshan Xu, and **Abdelghani Laraoui**. Study of spin waves in rare-earth garnet TmIG thin films, NRIC 2023 on Topology and Valley-Driven Quantum Phenomena, March 17, 2023, Lincoln, NE.
15. Adam Erickson,³ Qihan Zhang, Suvechhya Lamichhane,³ Sy-Hwang Liou, Jingshen Chen, and **Abdelghani Laraoui**. Studying the creation and motion of skyrmions in broken inversion symmetry CoPt gradient single-crystal thin films, NRIC 2023 on Topology and Valley-Driven Quantum Phenomena, March 17, 2023, Lincoln, NE.
16. Ben Hammons,¹ Rupak Timalisina,³ and **Abdelghani Laraoui**. Wire Bonding Thin Films for Ferromagnetic Resonance and Optically Detected, Magnetic Resonance Measurements, UNL's Lincoln Summer Research Fair, August 5, 2022.
17. Patrick Osborn,¹ Rupak Timalisina,³ and **Abdelghani Laraoui**. Automating A Ferromagnetic Resonance Spectroscopy Setup, UNL's Lincoln Summer Research Fair, August 5, 2022.

18. John Kunkee,¹ Mohammadjavad Dowran,⁴ and **Abdelghani Laraoui**. Studying Hexagonal Boron Flakes by Using Atomic Force Microscopy for Quantum Photonics, UNL's Lincoln Summer Research Fair, August 5, 2022.
19. Adam Erickson,³ Rupak Timalisina,³ Syed Qamar Abbas, Ather Mahmood, Christian Binek, and **Abdelghani Laraoui**. Imaging and Control of Antiferromagnetic Domains in Cr₂O₃, 2022 NRIC Workshop, Commercializing Quantum Technologies in Nebraska: From Research to Licensing, April 14, 2022, Lincoln, NE.
20. Suvechhya Lamichhane,³ Rupak Timalisina,³ Cody M. Schultz, Adam Erickson,³ Sy-Hwang Liou, Rebecca Y. Lai, and **Abdelghani Laraoui**. T₁ relaxometry of Fe Contained Biomolecules Using Nitrogen Vacancy Centers in Diamond, 2022 NRIC Workshop, Commercializing Quantum Technologies in Nebraska: From Research to Licensing, April 14, 2022, Lincoln, NE.
21. **Abdelghani Laraoui** and Victor M. Acosta. Time resolved diamond magnetic microscopy of single transition metal magnetic nanoparticles, APS March Meeting 2020, March 2–6, 2020, Denver, CO.
22. **A. Laraoui**, I. Fescenko, J. Smits, N. Mosavian, P. Kehayias, A. Jarmola, V. Acosta, Gordon conference, Time resolved diamond microscopy of magnetic nanostructures, Quantum Sensing Applications in Metrology and Imaging, June 2 - 7, 2019, Hong Kong, China.
23. N. Arnold, **A. Laraoui**, I. Fescenko, J. Smits, V. Acosta, Diamond Magnetic Microscopy of Individual Superparamagnetic Nanoparticles, 2018 Annual Meeting of the APS Four Corners Section, October 12–13, 2018; University of Utah, Salt Lake City, UT.
24. I. Fescenko, **A. Laraoui**, J. Smits, N. Mosavian, P. Kehayias, J. Seto, L. Bougas, A. Jarmola, V. Acosta, Diamond magnetic imaging of single paramagnetic biocrystals, Southwest Quantum Information and Technology Workshop, February 22-24, 2018. Santa Fe, N September 2017, CINT Sandia-LANL meeting, Santa Fe, NM.
25. **A. Laraoui**, N. Mosavian, J. Smits, I. Fescenko, V. Acosta, Imaging individual 25-nm superparamagnetic nanoparticles using diamond magnetic microscopy, Southwest Quantum Information and Technology Workshop, February 22-24, 2018. Santa Fe, N September 2017, CINT Sandia-LANL meeting, Santa Fe, NM.
26. **A. Laraoui**, H. Aycock-Rizzo, X. Lu, E. Riedo, C. A. Meriles. Nanoscale thermal conductivity imaging using scanning spin probe, 5th annual NanoMRI Conference, July 27-31, 2015, Waterloo, Canada.
27. T. An, **A. Laraoui**, C.A. Meriles. Broadening of ODMR Signal of NV center in Nanodiamond by Domain Wall Motion, 5th annual NanoMRI Conference, July 27-31, 2015, Waterloo, Canada.
28. **A. Laraoui**, H. Aycock-Rizzo, X. Lu, E. Riedo, C.A. Meriles. Imaging Thermal Conductivity with Nanoscale Resolution via a Scanning Spin Probe, NanoscienceNY meeting, February 19th, 2015, New York, NY.
29. **A. Laraoui**, C.A. Meriles. Exploring the Nitrogen Vacancy center as a high-resolution magnetic sensor in bulk and nanostructured diamond crystals, APS March Meeting, February 27 - March 2, 2012, Boston, MA.
30. **A. Laraoui**, J. S. Hodges, C. Ryan, C. A. Meriles. Exploring the Nitrogen Vacancy center as a high-resolution magnetic sensor, Gordon Research Conferences, Magnetic resonance, June 12-17, 2011, University of New England, Biddeford, ME.
31. C. A. Meriles, **A. Laraoui**, J. S. Hodges. T₁-limited Nitrogen-Vacancy magnetometry of fluctuating AC magnetic fields, APS March Meeting 2011, March 21-25, 2011, Dallas, Texas.
32. **A. Laraoui**, J. S. Hodges, C. A. Meriles. T₁-limited Nitrogen Vacancy magnetometry of fluctuating AC magnetic fields, Artificial atoms in diamond Workshop, November 11-13, 2010, Harvard University, Cambridge, MA.

33. **A. Laraoui**, J. S. Hodges, C. A. Meriles. Characterization of random AC magnetic fields using a single Nitrogen-Vacancy center, 3rd nano-MRI research conference: Exploring the Frontiers of Magnetic Resonance Imaging, July 12-16, 2010, Le Tremblay sur Mauldre, France.
34. F. Ciubotaru, H. Schultheiss, **A. Laraoui**, A. Serga, X. Janssens, M. van Kampen, L. Lagae, A.N. Slavin, B. Leven, B. Hillebrands. Oersted field influence on three-magnon-scattering processes in nano-point contact spin-valves, SPINSWITCH Summer School: Spin torque transfer and domain wall dynamics, September 14-18, 2009, Iași, Romania.
35. **A. Laraoui**, M. Albrecht, M. Vomir, J.-Y. Bigot. Magneto-optical pump probe Imaging of CoPt nanostructures, 20th International Colloquium on Magnetic Films and Surfaces, July 20–24, 2009, Berlin, Germany.
36. H. Schultheiss, F. Ciubotaru, **A. Laraoui**, A. Serga, X. Janssens, M. van Kampen, L. Lagae, A. N. Slavin, B. Leven, B. Hillebrands. Current controlled three-magnon-scattering in spin-torque nanocontact devices, 20th International Colloquium on Magnetic Films and Surfaces, July 20–24 2009, Berlin, Germany.
37. **A. Laraoui**, F. Ciubotaru, H. Schultheiss, A. Serga, S. Hermsdörfer, M. van Kampen, L. Lagae, B. Leven, A. N. Slavin, B. Hillebrands. Effect of a DC current on the magnetization dynamics in spin-valve nanocontacts, German Physical Society (DPG) spring meeting, March 22-27, 2009, Dresden, Germany.
38. H. Schultheiss, F. Ciubotaru, **A. Laraoui**, M. Manfrini, M. van Kampen, L. Lagae, A. N. Slavin, B. Leven, B. Hillebrands. Nonlinear spin-wave radiation in spin-torque nanocontact devices, Spin momentum transfer workshop, October 3 -5, 2008, Krakow, Poland.
39. H. Schultheiss, X. Janssens, M. van Kampen, S. Cornelissen, F. Ciubotaru, **A. Laraoui**, B. Leven, A. N. Slavin, L. Lagae, B. Hillebrands. Investigation of spin-wave radiation and current controlled three-magnon-scattering in spin-torque nanocontact devices, INTERMAG 2008, Madrid, Spain, May 4-8, 2008.
40. **A. Laraoui**, M. Vomir, M. Albrecht, J.-Y. Bigot. Magnetization dynamics of ferromagnetic dots: Studies with a femtosecond magneto-optical microscope, 11th France condensed matter meeting, August 25-29, 2008, Strasbourg, France.
41. V. Halté, L.H.F. Andrade, **A. Laraoui**, M. Vomir, J.-Y. Bigot. Magnetization precession of magnetic nanoparticles induced with femtosecond laser pulses, 11th France condensed matter meeting, August 25-29, 2008, Strasbourg, France.
42. **A. Laraoui**, V. Halté, M. Vomir, J. Vénuat, M. Albrecht, E. Beaurepaire, J.-Y. Bigot. Femtosecond spin dynamics of an individual, School on Nanomaterials for magnetism and spintronics, February 18-23, 2008, Strasbourg, France.
43. **A. Laraoui**, M. Albrecht, M. Vomir, E. Beaurepaire, J.-Y. Bigot. Time-resolved magneto-optical imaging of magnetic domains written in CoPt films with femtosecond laser pulses, Optics Grenoble 2007, July 2-5, 2007, Grenoble, France.
44. **A. Laraoui**, V. Halté, M. Vomir, E. Beaurepaire, J.-Y. Bigot. Time resolved magneto-optical imaging of magnetic domains written in CoPt films with femtosecond laser pulses, International Symposium on Spin Waves, June 16-21, 2007, Saint Petersburg, Russia.
45. **A. Laraoui**, J. Vénuat, V. Halté, M. Albrecht, M. Vomir, E. Beaurepaire, J.-Y. Bigot. Study of individual ferromagnetic dots with femtosecond optical pulses, 10th Joint MMM/Intermag Conference, January 7-11, 2007, Baltimore, Maryland.
46. **A. Laraoui**, V. Halté, M. Vomir, J. Vénuat, M. Albrecht, E. Beaurepaire, J.-Y. Bigot. Ultrafast spin dynamics of individual ferromagnetic dots, 3rd TMN (Trends in Materials and Nanosciences) Conference, November 5, 2006, Strasbourg, France.

47. A. Laraoui, V. Halté, M. Vomir, J. Vénuat, M. Albrecht, E. Beaurepaire, J.-Y. Bigot. Femtosecond spin dynamics of a single CoPt₃ dot, 13th ISSPIC Conference, July 23- 28, 2006, Goteborg, Sweden.
48. M. Vomir, L. Andrade, E. Beaurepaire, **A. Laraoui**, J.-Y. Bigot. Magnetization trajectory induced with femtosecond laser pulses: tridimensional study of magnetic anisotropy effects. 7th meeting on ultrafast phenomena, December 5-7, 2005, Lille, France.

Section 2.2.6 Numbered list (in reverse chronological order) of Invited talks or Keynote Speeches: underlined is the presenting author

1. Abdelghani Laraoui. Mapping spin reversal in antiferromagnet pure and boron doped Cr₂O₃ films, APS March Meeting 2024, March 16 - 21, 2025. Anaheim, CA
2. Abdelghani Laraoui. Studying Nanoscale Magnetic Phenomena Using Scanning Nitrogen-Vacancy Microscopy, the Quantum Workshop at Oak Ridge National Laboratory, August 14-16, 2025, Knoxville, TN.
3. Christos Argyropoulos, Mohammadjavad Dowran,⁴ Ufuk Kilic, Andrew Butler, Suvechhya Lamichhane,³ Adam Erickson,³ Sy-Hwang Liou, and **Abdelghani Laraoui**. Efficient Single Photon Emission with Quantum Plasmonic Nanocavities, 2024 IEEE International Symposium on Antennas and Propagation and ITNC-USNC-URSI, Special session; Quantum Technology Related to Electromagnetics, July 14-19, 2024, Florence, Italy.
4. Abdelghani Laraoui. Direct imaging of room temperature magnetic skyrmions in composition gradient CoPt single layer, invited seminar at [Online Spintronics Seminar](#), February 9, 2024.
5. Suvechhya Lamichhane,³ Cody Slutz, Rupak Timalisina,³ Ilja Fescenko, Kapildeb Ambal, Sy-Hwang Liou, Rebecca Y. Lai, and Abdelghani Laraoui. Magnetic sensing of iron in Cytochrome C using diamond nitrogen-vacancy magnetometry, 2024 MRS Spring Meeting, April 22-26, 2024, Seattle, WA.
6. Mohammadjavad Dowran,⁴ Ufuk Kilic, Andrew Butler, Suvechhya Lamichhane,³ Adam Erickson,³ Sy-Hwang Liou, Christos Argyropoulos, and Abdelghani Laraoui. Plasmonic Nanocavity Enhanced Quantum Properties of Single Photon Emitters in Hexagonal Boron Nitride, SPIE Photonics West 2024, January 29- February 2, 2024, San Francisco, CA.
7. Adam Erickson,³ Ather Mahmood, S.Q.A. Shah, Rupak Timalisina,³ Ilja Fescenko, Christian Binek, and Abdelghani. Laraoui. Nitrogen-Vacancy Microscopy of Antiferromagnetic Domains in Undoped and Boron Doped Cr₂O₃ Thin Films. **Invited Talk** at [The 68th Annual Conference on Magnetism and Magnetic Materials \(MMM\)](#), October 30 -November 3, 2023, Dallas, TX.
8. Abdelghani Laraoui. Diamond quantum sensing microscopy of Fe-triazole spin crossover molecules/Fe-containing biomolecules, **Invited Virtual Talk** at [Big Quantum Biology Meetings](#), October 26, 2023.
9. Abdelghani Laraoui. Diamond magnetometry of spin textures in thin magnetic films, **Invited Talk**, Gordon Research Conference, [Frontiers of Sensing in the Quantum Regime with Atomic, Solid-State and Photonic Systems](#), July 23 – 28, 2023, Les Diablerets, Switzerland.
10. Abdelghani Laraoui. Probing Nanoscale Magnetic Phenomena Using Diamond Quantum Sensing Microscopy, **Invited Lecture**, [Virtual Lecture Series on Nanodiamond](#), January 19, 2023. Sponsor: online.
11. Abdelghani Laraoui. Quantum Sensing, UNL's Grand Challenges 2025 vision, **Invited Talk**, workshop on Quantum Science and Engineering, October 19-20, 2021, Lincoln, NE.
12. Abdelghani Laraoui. Quantum Sensing and Technologies, **Invited Talk**, EPSCoR workshop on Emergent quantum materials and Technologies (EQUATE), March 26-27, 2021, Lincoln, NE.
13. Abdelghani Laraoui. Diamond quantum sensing, **Invited Lecture**, Quantum Information Science biweekly seminar series, April 5th, 2020, Ames Laboratory-Iowa State University, Ames, IA.

14. **Abdelghani Laraoui**. Nanoscale Magnetic Resonance Spectroscopy using Nitrogen Vacancy Centers in Diamond, **Keynote Lecture**, 2017 NMR², April 15, 2017, Albuquerque, NM.
15. **A. Laraoui**, I. Fescenko, N. Mosavian A. Jarmola, P. Kehayias, V. Acosta. Solution NMR and EPR on a diamond chip, **Invited Talk**, The 20th Meeting of the International Society of Magnetic Resonance (ISMAR 2017), July 23-28, 2017, Québec City, Canada.
16. **A. Laraoui**, H. Aycock-Rizzo, Y. Gao, E. Riedo, **C. A. Meriles**. Nanoscale thermal imaging using a scanning spin probe, APS March Meeting March 14–18, 2016, Baltimore, MD.
17. **A. Laraoui**, H. Aycock-Rizzo, X. Lu, E. Riedo, **C. A. Meriles**. Nanoscale Imaging of Thermal Conductivity Using Nitrogen Vacancy Center in Nanodiamond, **Invited Talk** META'15, the 6th International Conference on Metamaterials, Photonic Crystals and Plasmonics, August 3-7, 2015, New York, NY.
18. **A. Laraoui**, **C. A. Meriles**, Approach to dark spins initialization in nanodiamond, **Invited Talk**, Workshop on Diamond- spintronics, photonics, bio-applications, April 27-29, 2013, Hong Kong.
19. **C. A. Meriles**, **A. Laraoui**. The Nitrogen-Vacancy center as a probe of mesoscopic spin ensembles, **Invited Talk**, Gordon Research Conferences, Magnetic resonance, June 12-17, 2011, University of New England, Biddeford, ME.
20. **B. Hillebrands**, H. Schultheiss, F. Ciubotaru, **A. Laraoui**, M. van Kampen, L. Lagae, and A. N. Slavin. Current Induced Spin-Wave Emission from Ferromagnetic Nanostructures, **Invited Talk**, International Symposium: Twenty Years of Spintronics Retrospective and Perspective, December 8-9, 2009, Paris, France.
21. **B. Hillebrands**, H. Schultheiss, B. Obry, F. Ciubotaru, **A. Laraoui**, S. Hermsdörfer, A.A. Serga, M. van Kampen, X. Jenssens, L. Lagae, and A. N. Slavin. Nanomagnetism – a perspective from the dynamic side, **Keynote Lecture**, Trends in NanoTechnology International Conference, September 07-11, 2009, Barcelona, Spain.
22. **B. Hillebrands**, H. Schultheiss, F. Ciubotaru, **A. Laraoui**, M. van Kampen, L. Lagae, and A. N. Slavin. Current Induced Spin-Wave Emission from Ferromagnetic Nanostructures, **Invited Talk**, International Magnetics Conference 2009, May 4-8, 2009, Sacramento, California.
23. **B. Hillebrands**, H. Schultheiss, F. Ciubotaru, **A. Laraoui**, M. van Kampen, L. Lagae, and A. N. Slavin. Current Induced Spin-Wave Emission from Ferromagnetic Nanostructures, **Invited Talk**, IEEE nanotechnology materials and devices Conference. October 20-22, 2008, Kyoto, Japan.
24. **A. Laraoui**, M. Vomir, E. Beaurepaire, J.-Y. Bigot. Femtosecond spin dynamics in magnetic nanostructures, July 16th, 2007, **Invited Talk**, International Quantum Electronics Conference – Europe, June 17-22, 2007, Munich, Germany.
25. **J.-Y. Bigot**, **A. Laraoui**, M. Vomir, M. Albrecht. Ultrafast magnetization dynamics: concept and applications to spin photonics, **Invited Talk**, FCILA 2007, June 4-7, 2007, Lyon, France.
26. **J.-Y. Bigot**, M. Vomir, L.H.F. Andrade, E. Beaurepaire, **A. Laraoui**. Recent progresses in Femtomagnetism: Time dependent anisotropy and dynamics of superparamagnets, **Invited talk**, Workshop on Novel trends in magnetism, October 1-7, 2005, Corfu, Greece.

Section 2.2.7 Numbered list (in reverse chronological order) of Invited Seminars since joined UNL

1. **A. Laraoui**. Diamon Quantum Sensing Microscopy, Seminar, University of Washington, Seattle, April 24, 2024.
2. **A. Laraoui**. Studying Nanoscale Magnetic Phenomena in Magnetic Thin Films Using Diamond Magnetic Microscopy, MME Seminar, September 6, 2023.
3. **A. Laraoui**. Studying Nanoscale Magnetic Phenomena in Magnetic Thin Films Using Diamond Magnetic Microscopy, EQUATE/NCMN Seminar, September 6, 2023.

4. **A. Laraoui.** Study Nanoscale Magnetic Phenomena with Nitrogen-Vacancy Magnetic Microscopy, Institute of Chemistry and Materials of Strasbourg, July 19, 2023, Strasbourg, France
5. **A. Laraoui.** Diamond Magnetometry studies of nanoscale magnetic phenomena, May 8, 2023, Department of Physics, University of Nebraska-Kearny, Kearny, NE
6. **A. Laraoui.** Probing solid state Phenomena in quantum materials using quantum sensors, March 22, 2023, Department of Physics and Astronomy, Wichita State University, Wichita, KS.
7. **A. Laraoui.** Studying individual spin-crossover Fe-triazole nanorods, April 5, 2023, Department of Physics and Astronomy, City College of New York, New York, NY.
8. **A. Laraoui.** Diamond quantum sensing microscopy for chemistry applications, November 2022, Department of Chemistry, University of Nebraska-Lincoln,
9. **A. Laraoui.** Diamond scanning probe microscopy of antiferromagnets, April 2021, Optical Science Engineering seminar at Center of High Technology Materials- University of New Mexico, Albuquerque, NM.
10. **A. Laraoui.** Diamond quantum sensing, October 2020, Department of Chemistry, University of Nebraska-Lincoln, invited guest lecture for Prof. Rebecca Lai course, Lincoln, NE.
11. **A. Laraoui.** Quantum diamond microscopy: A new tool for quantum sensing, September 2020, Department of Physics and Astronomy, Creighton University, Omaha, NE.
12. **A. Laraoui.** Diamond Nitrogen Vacancy Centers for Quantum Sensing, October 2019, Nebraska Center of Materials Nanoscience Seminar series, Lincoln, NE.

Section 2.3 Research Patents and Awards

Section 2.3.1 Numbered list of Patents

1. **Title:** Method for hyper-polarizing nuclear spins at arbitrary magnetic fields. **List of Investors:** Carlos A. Meriles, Daniela Pagliero, and **Abdelghani Laraoui**, [US Patent App. 14/961,974](#). Date of publication; January 15, 2019.

Section 2.3.2 Numbered list of all National and International Research Awards and Recognition

1. New York Academy of Sciences' Blavatnik Award (nominated) for best postdoctoral , City College of New York. 10/2013.
2. Marie Curie Postdoctoral Fellowship, 10/2007-3/2009, University of Kaiserslautern of Technology Kaiserslautern, Germany.
3. French Optical Society Award to attend Spintronics Summer School, Cargese, France, 5/2005-6/2005.

Section 3 Teaching Accomplishments (other than classroom instruction)

Section 3.1 Postdoctoral Researchers

Section 3.1.1 Numbered list (in reverse chronological order) of Postdoctoral researchers supervised at UNL

1. Dr. Mohammadjavad Dowran, Ph.D. in Atomic-Molecular & Optical Physics, University of Oklahoma; Norman, OK, August 2021. **Direct supervision at UNL:** 100%. **Dates of Appointment:** 9/1/2021 – 6/30/2023. **Percentage Funding provided by me:** 100% **Funding:** 9/1/2021- 6/30/2020 (Laraoui UNL startup). **Current employment:** Advanced R&D Engr/Scientist – Honeywell, Minneapolis, MN.

2. **Jitender Kumar**, Ph.D. in Condensed Matter Physics, UGC-DAE Consortium for Scientific Research, Indore, India, 2015. **Direct supervision at UNL: 100%. Dates of Appointment: 11/1/2024 – 10/31/2026. Percentage Funding provided by me: 100% Funding: 10/29/2024- 5/31/2026 (NSF).**

Section 3.2 Ph.D. Students

Section 3.2.2 Numbered list (in reverse chronological order) of PhD students whom you have supervised as chair or co-chair of their doctoral committees at UNL

1. Rupak Timilsina. **Status:** defended his Ph.D. thesis on April 26, 2024. **Co-supervisor:** None. **Funding:** 9/1/2020 - 5/31/2021 (UNL startup), 6/1/2021-5/31/2024 (NSF), **Graduation date:** 5/2024.
2. Adam Erickson. **Status:** passed the comprehensive exam on April 15 of 2024. **Co-supervisor:** None. **Funding:** 1/1/2020 - 10/31/2020 (MRSEC), 11/1/2020 - 7/31/2021 (UNL startup), 8/1/2021- present (NSF), **Graduation date:** 12/2024.
3. Suvechhya Lamichhane, **Status:** passed the comprehensive exam in June of 2024. **Co-supervisor:** 50%. **Supervisor:** Sy-Hwang Liou (50%). **Funding:** 9/1/2021 - present (NSF), **Graduation date:** 4/2025.
4. Mourad Zouhri, **Funding:** 1/1/2024 – 8/1/2024 (NSF), **Co-supervisor:** None, **Status:** left UNL.
5. Sehrish Iqbal, **Status:** joined my group on May 20, 2024. **Co-supervisor:** None. **Funding:** 5/1/2024 - present (UNL' Grand Challenges award), **Expected graduation date:** 5/2028.
6. Swapnil Barman, **Status:** joined my group on June 1st, 2024. **Co-supervisor:** None. **Funding:** 6/1/2024 - present (NSF), **Expected graduation date:** 5/2029.
7. Walter Chin, **Funding:** 1/1/2020 – 8/1/2021 (NSF), **Co-supervisor:** None, **Status:** changed the group.

Section 3.3 Undergraduate Students

Section 3.3.1 Numbered list (in reverse chronological order) of undergraduate students supervised in independent research study at UNL

1. Ben Hammons, Electrical Engineering (ECE), UNL, **Funding:** 8/26/2023- present (paid by Laraoui through UNL' grand challenges center award cost object 21-0527-4005). **Number of research hours:** 12h/week during Spring/Fall semesters and 25h/week during the summer.
2. Joshua Barker, Electrical Engineering (ECE), UNL, **Funding:** 8/26/2023- present (paid by Laraoui NSF funds cost object 25-0521-0238-005). **Number of research hours:** 10h/week.
3. Mason Brady, Northern Michigan University, 6/1/2024- 8/31/2024 (REU paid through NSF EQUATE center), **Number of research hours:** 40h/week.
4. Dylan Jacks, Iowa State University, 6/1/2024- 8/31/2024 (REU paid through NSF EQUATE center), **Number of research hours:** 40h/week.
5. Nathan Rieneke, Agricultural engineering (AGEN), UNL, **Funding:** 1/17/2023- present (Laraoui startup + UCARE funding), **Number of research hours:** 12h/week.
6. Enrique Stolz, Alfred University, New York. **Funding:** 6/1/2023- 8/31/2023 (REU paid through NSF EQUATE center), **Number of research hours:** 40h/week.
7. Mauricio Velasco, Central Community College in Columbus, NE. **Funding:** 6/1/2023- 8/31/2023 (REU through NSF EQUATE center), **Number of research hours:** 40h/week.

8. Patrick Osborn, Department of Physics and Astronomy, Ohio State University, **Funding:** 6/1/2022-8/31/2022 (REU through NSF EQUATE center), **Number of research hours:** 40h/week.
9. John Kunkee, Department of Physics, Nebraska Wesleyan University, **Funding:** 6/1/2022- 8/31/2022 (REU through NSF EQUATE center), **Number of research hours:** 40h/week.
10. Riley Chase, Mechanical & Materials Engineering (MME) -UNL, **Funding:** 10/1/2021- 12/31/2022 (Laraoui startup), **Number of research hours:** 12h/week.
11. Mohammad Sbaji, Mechanical & Materials Engineering (MME) -UNL, **Funding:** 9/1/2020- 5/31/2022 (my NSF funds from cost object 26-1123-0243-001), **Number of research hours:** 10h/week.
12. Thomas Baumert, Mechanical & Materials Engineering (MME)-UNL, **Funding:** 1/1/2020- 5/31/2020 (my NSF funds from cost object 26-1123-0243-001), **Number of research hours:** 10h/week.
13. Abdul Majeed Al Naabi, Mechanical & Materials Engineering (MME) -UNL, **Funding:** 10/1/2019-3/31/2020 (my NSF funds from cost object 26-1123-0243-001), **Number of research hours:** 10h/week.

3.3.3 High School Students supervised at UNL

1. Ben Hammons, Lincoln Public Schools, **Funding:** 6/1/2022- 8/12/2022 and 6/1/2023- 8/12/2023 (paid via NCMN Young Nebraska Scientists award), **Number of research hours:** 30h/week.

Section 3.4 Visiting Scholars and Students at UNL

Section 3.4.1 Numbered list (in reverse chronological order) of visiting scholars and students supervised during their official visit to UNL.

1. Yifei Wang, visiting PhD student. **Home affiliation:** Japan Advanced Institute of Science and Technology, Nomi, Japan. **Dates of visit to UNL:** 9/1/2023 – 12/31/2023.
2. Thitinun (Nick) Gas-osoith, visiting PhD student. **Home affiliation:** Japan Advanced Institute of Science and Technology, Nomi, Japan. **Dates of visit to UNL:** 5/4/2023 – 8/3/2023.
3. Sajib Halder, visiting MS student. **Home affiliation:** Wichita State University, Wichita, KS. **Dates of visit to UNL:** 5/1/2021 – 7/31/2021.
4. Dr. Kapildeb Ambal, Visiting Assistant Professor. **Home affiliation:** Wichita State University, Wichita, KS. **Dates of visit to UNL:** 5/1/2021 – 7/31/2021.

Section 3.5 Graduate Student Committee Membership

Section 3.5.1 Numbered list (in reverse chronological order) of UNL PhD students for whom I have served as a doctoral committee member

1. Suvechhya Lamichhane (PhD Supervisor: Sy-Hwang Liou, PhD Co-supervisor: Abdelghani Laraoui), UNL Department of Mechanical and Materials Engineering Department. She passed the comprehensive exam on 6/27/2024 and will graduate on 4/2025.
2. Adam Erickson (PhD supervisor: Abdelghani Laraoui), UNL Department of Mechanical and Materials Engineering Department. He passed the comprehensive exam on 4/228/2024 and will graduate on 11/25/2024.
3. Sulaiman Mohaidat (PhD supervisor: Fadi Alsaleem), UNL Department of Mechanical and Materials Engineering. He will graduate on 10/18/2024.
4. Syed Qamar Abbas Shah (PhD supervisor: Christian Binek), UNL Physics and Astronomy Department. He will graduate on 10/18/2024.

5. Sri Bhavya Muvva (PhD supervisor: Martin Centurion), UNL Physics and Astronomy Department. She will graduate on 9/5/2024.
6. Rifat Mahbub (PhD supervisor: Jeffery E. Shield), UNL Department of Mechanical and Materials Engineering. Graduated on 7/23/2024.
7. Rupak Timalsina (PhD supervisor: Abdelghani Laraoui), UNL Department of Mechanical and Materials Engineering Department. Graduate on 4/26/2024.
8. Kai Huang (PhD Supervisor: Evgeny Tsymbal), UNL Department of Physics & Astronomy. Graduated on 12/11/2023.
9. Alexander Ruder (PhD Advisor: Mathias Schubert), UNL Department of Electrical and Computer Engineering department. Graduated on 11/30/2023.
10. Ali Al-Ramini (PhD Advisor: Fadi Alsaleem), UNL Department of Mechanical and Materials Engineering Department. Graduated on 11/13/2023.
11. Ahsan Ullah, (PhD Advisor: Xiaoshan Xu), UNL Department of Physics & Astronomy. Graduated on 6/20/2023.
12. Kun Wang (PhD Supervisor: Xia Hong), UNL Department of Physics & Astronomy. Graduated on 5/1/2023.
13. Megan Stokey (PhD Advisor: Mathias Schubert), UNL Department of Electrical and Computer Engineering department. Graduated on 4/26/2023.
14. Haohan Wang (PhD Supervisor: Xiaoshan Xu), UNL Department of Physics & Astronomy. Graduated on 7/6/2022.
15. Matt Hilfiker (PhD Advisor: Mathias Schubert), UNL Department of Electrical and Computer Engineering department. Graduated on 4/19/2022.

Section 3.5.2 Numbered list (in reverse chronological order) of other PhD students at other universities for whom I have served as an external PhD reviewer.

1. Sam Scholten (PhD Advisor: David Simpson), Node Manager for the ARC Centre of Excellence for Quantum Biotechnology (QUBIC), The University of Melbourne, Victoria 3010 Australia. He will graduate in August 2024.
2. Liam Hanlon (PhD Advisor: Marcus Doherty), Research School of Physics and Engineering, Laser Physics Center, Australian National University, Canberra, Australia. Graduated on 3/2022.

Section 3.6 Other Teaching Accomplishment (overall teaching grade score = 4.2/5):

- **Spring 2024:** MATL-492/892: Introduction to Quantum Materials and technologies. **Course Description:** This course introduces basic laws of quantum mechanics (coherence, entanglement, two-level system, topology, etc.) and introduces revolutionary quantum technologies including quantum communications, quantum sensing, and quantum computing. The boundary between classical and quantum physics, quantization of electromagnetic (EM) field and its consequences, quantum electromagnetic and atomic physics, quantum topological materials and their applications in quantum technologies are discussed. **Number of Students Attended:** 15 (4 undergraduate + 11 graduates). **Course evaluation results:** 4.14/5.
- **Fall 2023:** MATL360/260, Elements of Materials Science Relation of atomic, molecular and crystal structure to the physical, mechanical and chemical properties of metals, alloys, polymers and ceramics, Experience in investigation of properties of engineering materials. **Number of Students Attended:** 70, **Course evaluation results:** 4.45/5 (averaged for labs and lecture).

- **Spring 2023:** MATL-492/892: Introduction to Quantum Materials and technologies. **Course Description:** This course introduces basic laws of quantum mechanics (coherence, entanglement, two-level system, topology, etc.) and provides an introduction to revolutionary quantum technologies including quantum communications, quantum sensing, and quantum computing. The boundary between classical and quantum physics, quantization of electromagnetic (EM) field and its consequences, quantum electromagnetic and atomic physics, quantum topological materials and their applications in quantum technologies are discussed. **Number of Students Attended:** 15 (4 undergraduate + 11 graduates). **Course evaluation results:** 4.65/5 (averaged).
- **Fall 2022:** MATL360/260, Elements of Materials Science Relation of atomic, molecular and crystal structure to the physical, mechanical and chemical properties of metals, alloys, polymers and ceramics, Experience in investigation of properties of engineering materials. **Number of Students Attended:** 70, **Course evaluation results:** 4.41/5 (averaged for labs and lecture).
- **Spring 2022:** MATL-492/892: Introduction to Quantum Materials and technologies. **Course Description:** This course introduces basic laws of quantum mechanics (coherence, entanglement, two-level system, topology, etc.) and introduces revolutionary quantum technologies including quantum communications, quantum sensing, and quantum computing. The boundary between classical and quantum physics, quantization of electromagnetic (EM) field and its consequences, quantum electromagnetic and atomic physics, quantum topological materials and their applications in quantum technologies are discussed. **Number of Students Attended:** 26 (7 undergraduate + 19 graduates). **Course evaluation results:** 3.95/5 (averaged).
- **Fall 2021:** MATL360/260, Elements of Materials Science Relation of atomic, molecular and crystal structure to the physical, mechanical and chemical properties of metals, alloys, polymers and ceramics, Experience in investigation of properties of engineering materials. **Number of Students Attended:** 71, **Course evaluation results:** 4.184/5 (averaged for labs and lecture).
- **Spring 2021:** Devolved a new class MATL-492/892: Introduction to Quantum Materials and technologies. **Course Description:** This course introduces basic laws of quantum mechanics (coherence, entanglement, two-level system, topology, etc.) and introduces revolutionary quantum technologies including quantum communications, quantum sensing, and quantum computing. The boundary between classical and quantum physics, quantization of electromagnetic (EM) field and its consequences, quantum electromagnetic and atomic physics, quantum topological materials and their applications in quantum technologies are discussed. **Number of Students Attended:** 12 (2 students from UNL's Physics & Astronomy Department), **Course evaluation results:** 4.1/5 (averaged).
- **Fall 2020:** MATL360-260, Elements of Materials Science Relation of atomic, molecular and crystal structure to the physical, mechanical and chemical properties of metals, alloys, polymers and ceramics. Experience in investigation of properties of engineering materials. **Number of Students Attended:** 70, **Course evaluation results:** 4.08/5 (averaged for labs and lecture).
- **Spring 2020:** MATL360-260, Elements of Materials Science Relation of atomic, molecular and crystal structure to the physical, mechanical and chemical properties of metals, alloys, polymers and ceramics. Experience in investigation of properties of engineering materials. **Number of Students Attended:** 72. **Course evaluation results:** 4.033/5 (averaged for labs and lecture).

Section 4 Service Accomplishments

Section 4.1 Professional Service

Section 4.1.1 Numbered list (in reverse chronological order) of Journals for which I have reviewed papers.

1. Advanced Functional Materials: 1 in 2024
2. Small: 1 in 2024
3. Nano Letters: 1 in 2024, 2 in 2023
4. ACS Nano: 1 in 2024, 2 in 2023
5. Nature publishing group (NPG) Asia Materials: 1 in 2023
6. Advanced Materials: 2 in 2024, 1 in 2023
7. Nanophotonics: 1 in 2022
8. Nature Communications: 1 in 2024, 2 in 2023, 2 in 2020, 1 in 2019
9. Physics Review Letters: 1 in 2023, 2 in 2022, 3 in 2021, 2 in 2020, 1 in 2019
10. Physics Review X: 1 in 2020, 1 in 2019
11. Physics Review X Quantum: 1 in 2020
12. Applied Physics Letters: 1 in 2024, 2 in 2023, 2 in 2022, 2 in 2021, 2 in 2020
13. Physics Review Applied: 2 in 2024, 2 in 2022, 2 in 2021, 1 in 2020
14. APL Photonics: 1 in 2024, 1 in 2021, 1 in 2020
15. Physical Review B: 2 in 2023, 2 in 2022, 2 in 2021, 2 in 2020, 2 in 2019
16. Physics Review Materials: 2 in 2021, 1 in 2020
17. International Laser Physics: 1 in 2020

Section 4.1.2 Numbered list (in reverse chronological order) memberships in Professional Organizations

1. American Physical Society (APS), member: 10/2019 – present.
2. Materials Research Society (MRS), member: 10/2021– present.
3. International society for optics and photonics (SPIE), member: 11/2023– present.
4. IEEE Magnetics Society, member: 9/2023– present.

Section 4.1.3 Numbered list (in reverse chronological order) of Research Review panels.

1. National Science Foundation (NSF), EPSCoR, E-RISE panel, 10/2024 - 11/2024. Reviewed 6 proposals and discussed them in a review panel.
2. National Science Foundation (NSF), Electrical, Communications, and Cyber Systems (ECCS), EPDM, 6/2024. Reviewed 5 proposals and discussed them in a review panel.
3. National Science Foundation (NSF), Graduate Research Fellowships Program (GRFP), 12/2023 – 1/2024. Reviewed 17 proposals and discussed them in a review panel.
4. National Science Foundation (NSF), Convergence Accelerator Track C (Quantum Sensing), 3/2021-6/2021, reviewed 10 proposals (total amount for funding is \$20M distributed over 4 proposals (3-year Phase 2 projects), Served in the review panel on June 17-18, 2021.

Section 4.1.4 Numbered list (in reverse chronological order) of reviewed Research Proposals

1. Department of Energy (DOE), High Energy Physics, 9/2024. Ad hoc reviewer of one proposal.
2. Swiss National Science Foundation (SNSF), NewSpin: Nanoscopic Explorations of Novel Spintronics Materials, 8/2024. Ad hoc reviewer of one proposal.
3. French National Research Agency (ANR), 9/2023, QuantERA ERA-NET Cofund in Quantum Technologies. Ad hoc reviewer of one proposal.
4. Department of Energy (DOE), Funding for Accelerated, Inclusive Research (FAIR) program, 5/2023. Ad hoc reviewer of one proposal.
5. Department of Energy (DOE), Reaching a New Energy Sciences Workforce (RENEW) program, 6/2023. Ad hoc reviewer of one proposal.
6. National Science Foundation (NSF), SBIR/STTR program, 4/2021. Ad hoc reviewer of one proposal.

Section 4.2 University Service at UNL

Section 4.2.1 Numbered list of membership positions on university wide committees

1. 12/2021- 4/2022, member of EQUATE Quantum Search Committee to hire a tenure track Assistant Professor at UNL's Physics & Astronomy Department. Committee members: Christian Binek (lead), Abdelghani Laraoui, Xia Hong, Evgeny Tsymbal, and Robert Streubel.
2. 4/2023- 12/2023, member of EQUATE Quantum Search Committee to hire a tenure track Assistant Professor at UNL's Physics & Astronomy Department. Committee members: Xiaoshan Xu (lead), Abdelghani Laraoui, Shireen Adenwalla, Alexei Gruverman, and Alexey Kovalev. We hired [Dr. Zuocheng Zhang](#) from the University of California, Berkeley. He joined the UNL Physics Department on July 1st, 2024.
3. 11/1/2020- 4/30/2021, served as a member of the Electrical & Computer Engineering (ECE) Quantum Materials Search Committee. Committee members: Yongfeng Lu (lead), Abdelghani Laraoui, Wei Bao, Eva Schubert, Christos and Argyropoulos. Goal: hire an Assistant Professor to join ECE and UNL's quantum initiative. Accomplishment: we hired [Laura Wang](#), an expert in hybrid quantum optics systems.
4. Member of Materials Science Graduate Admissions Committee, 2021-present, Department of Mechanical and Materials Engineering, University of Nebraska-Lincoln. Committee members: Bai Cui, Lucia Fernandez Ballester, and Abdelghani Laraoui.
5. I engaged with many outreach activities over the last 4 years that include: hosting 12 high school students from Lyons Decatur High School (Lincoln, NE) in January 2024 (made lab tours, showed basic quantum experiments); gave a presentation on diamond quantum sensing to high school students through NCMN Young Nebraska Scientists in the summer of 2022.
6. I organized the [2024 Nebraska Research and Innovation Conference -Diamond Quantum Sensing: Challenges and Opportunities-](#) that took place on Thursday, March 14, 2024 in Lincoln, NE. 110 person attended the workshop from Iowa, Nebraska, and Kansas.
7. I helped with the NCMN/NNF 7-Years review. I gave a presentation on my research and how important NMCN facilities are important to my group. I also participated in the discussion with the UNL Grande Challenges team with external reviewers.

8. I gave a plenary talk on quantum sensing aspects at UNL's Grand Challenges "Quantum Science and Engineering" meeting on October 19-20, 2021.
9. I was part of the group directed by Christian Binek and David Sellmyer to draft the next 5-year grand challenges of UNL in the Quantum Science and Engineering along the N2025 vision. Over the course of 6 months, I participated and hosted online sessions to choose the urgent challenges of UNL to make it recognized nationally and internationally in quantum technologies. We were fortunate that we got selected, drafted with help of some department chairs (*e.g.*, Jeffery Shield), and submitted a 3-page document to ORED (Nathan Meier).
10. I reviewed graduate applicants for Materials Engineering (MEAM) since 2021.
11. 10/2023. I helped MME during ABET 2023 MME department evaluation: Met with ABET evaluator to discuss the MATL-260/360 class; supervised the TAs to adjust/clean up the labs, etc.
12. I reviewed many senior design projects at MME department over the last five years.

List of references

1. [Prof. Carlos A. Meriles](#)

Professor of Physics
City College of New York-CUNY
Center for Discovery and Innovation, Rm 12378
85 St. Nicholas Terrace New York, NY 10031, USA.
Email: cmeriles@ccny.cuny.edu

2. [Prof. Jingsheng Chen](#)

Professor of Materials Science and Engineering
National University of Singapore
Blk EA, #03-09 9 Engineering Drive 1 Singapore 117575
Email: msecj@nus.edu.sg

3. [Prof. Christos Argyropoulos](#)

Associate Professor of Electrical Engineering Department
The Pennsylvania State University
203 Electrical Engineering East
Email: cfa5361@psu.edu

4. [Prof. Victor M. Acosta](#)

Associate Professor of Physics
Department of Physics & Astronomy
Center for High Technology Materials
University of New Mexico
1313 Goddard St. SE
Albuquerque, NM 87106
Email: victormarcelacosta@gmail.com