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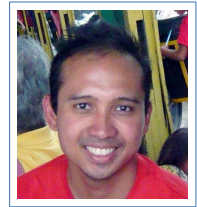
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Nationality: Filipino



Fritz Diorico

Curriculum Vitae

Profile

Physicist with over a decade of experience in quantum physics, photonics, and laser technologies. Strong background in experiments and engineering research, innovation, and academic mentoring. Passionate about developing physics education and research with strong practical applications in the Philippines.

Research Interests

- Experimental and applied physics education, basic to advanced - Quantum sensing and precision metrology - Photonics and laser stabilization technologies - Fiber-optic sensing applications especially on environmental undersea sensing: seismic, marine, man-made, etc..

Previous/Current Employment

- May 2023 – Present **BSF Fellow, Wilbe - Home for Scientist Leaders**, London, England, United Kingdom · Remote
Class 9 - Become Science Founder (BSF9)
<https://www.wilbe.com/>
- August 2022 – October 2024 **Xista fellow formerly TWIST, Institute of Science and Technology Austria**, Klosterneuburg, Austria
Towards the commercialization of ultra-low frequency noise and widely tunable lasers.
FFG Spin-Off Fellowship Project Leader: Future Lasers: aka Tulon Photonics, Start: April 2023.
<https://xista.io/>
- July 2018 – July 2022 **Post Doctoral Researcher, Onur Hosten Group, Institute of Science and Technology Austria (IST-Austria)**, Klosterneuburg, Austria
Quantum Sensing with Atoms and Light: Towards collective enhancement and spin squeezing with atoms in a high-finesse optical cavity.
<https://hostenlab.pages.ist.ac.at/>
<https://ista.ac.at/en/home/>
- November 2010 – March 2018 **Project Research Assistant, Atomchip Group, Atominstitut Technische Universität Wien (Institute of Atomic and Subatomic Physics, Vienna University of Technology)**, Vienna, Austria
PhD and Post-Doctoral work on the cryogenic atomchip experiment in Jörg Schmiedmayer's group.
<https://atomchip.org>
- 2008–2010 **Full Scholar, Erasmus Mundus MSc Photonics**, Belgium/Scotland
Full scholarship grant to pursue the double degree from the Erasmus Mundus MSc Photonics program.
- March-July 2007 **Intern, Koshin Philippines Corporation**, Mactan, Philippines
Worked briefly as an intern on Physical Vapour Deposition of thin film coatings for lenses.

Education

Academic Qualifications

- 2011–2016 **Doctor of Philosophy in Physics, (Completed on 27 October 2016)**, Atominstitut, Technische Universität Wien, Vienna, Austria, PhD work in Jörg Schmiedmayer's group, **Graduated with the highest possible mark, 'Sub auspiciis Praesidentis' - qualified**, Official title: *Doctor rerum naturalium, Dr.rer.nat*
Member of the Complex Quantum Systems (CoQuS) Doctoral program.

- 2008–2010 **Erasmus Mundus Masters of Science in Photonics**, *Graduated with Distinction*,
- 2009–2010 **MSc. Thesis and coursework**, *Heriot-Watt University*, Edinburgh, UK, *2nd Year of Erasmus Mundus MSc. Photonics*
Nanophysics (SUPA course), Nanoscience Primer, Advanced Photonics Laboratory, Nanochemistry
- 2008–2009 **MSc Coursework**, *Ghent Univeristy and Vrije Universiteit Brussel*, Belgium, *1st year of Erasmus Mundus MSc. Photonics*.
1 semester each university for coursework.
- 2003–2008 **BSc. Applied Physics**, *University of San Carlos*, Cebu, Philippines, *Cum Laude*
- 1992–2003 **Elementary-High School**, *Sacred Heart School- Ateneo de Cebu*, Cebu, Philippines,

Notable Projects

- **Post Doctoral work + Technology transfer: 'Future Laser technologies and Quantum Sensing'**
I was the first and sole postdoctoral researcher in Onur Hosten's Quantum Sensing group at IST-Austria, where I played a pivotal role in the development of groundbreaking quantum sensing experiments. Together with Onur, I co-invented an advanced laser frequency stabilization technology that significantly outperformed industry standards, achieving major breakthroughs in bandwidth and sensitivity for photonics applications. Additionally, I led the Austrian government-funded spin-off project, Future Lasers, driving innovation in laser technology and positioning the project at the forefront of the field.
<https://shorturl.at/uGtfY>
- **PhD Thesis: 'Novel Atomchip Technologies with Superconductors'**
The work involved combining ultracold atomic physics and superconductivity. A magnetic transport was built to bring ultracold ⁸⁷Rb atoms into a cryogenic environment. The setup opens up new atomchip technologies with superconductors either novel superconducting traps or with hybrid quantum systems experiments towards long-lived quantum memories for quantum computers.
- **MSc Thesis: 'Non-Abelian Atom Optics with Ultracold Atoms'**
Research was completed at the Quantum Optics and Cold Atoms research group of Patrik Öhberg in Heriot Watt University, Edinburgh, UK. The objective was to study the matter-wave inteferometry dynamics of a quantum optically dressed 4-level system exhibiting artificial non-Abelian gauge fields.
- **Industrial and BSc.Thesis Project: 'Three-dimensional Surface Reconstruction of Lenses through Fourier Domain Analysis of Interferograms'**
This project was done along with the internship at Koshin Philippines Corporation to improve one of their quality control processes. The project deals with interferogram analysis using Fourier transform for phase recovery, phase unwrapping in C.
- **BSc. Project: 'Numeric Recognition using Boltzmann Machine'**
Boltzmann Machine Neural Network implementation in C for handwritten character recognition.

Awards and Distinctions

- **FFG Spin-Off Fellowship Grant 2023:** (~ 500k€) Future Lasers, spin-off founder and project leader, [FFG: Austrian Research Promotion Agency]
- **IST-Austria TWIST Fellowship** (now xista Innovations fellow) 2022
- **CoQuS alumni** Complex Quantum Systems Doctoral Fellowship, <https://www.coqus.at/> now VCQ. *Interviewed by a team led by 2022 Nobel laureate Anton Zeilinger to get admitted to the program.*
- **Erasmus Mundus Full Scholarship 2008-2010** Erasmus Mundus MSc. Photonics Program
- **Erasmus Mundus MSc Photonics Innovation Competition Winner** Won the most innovative idea for a Photonics business contest at the Erasmus Mundus MSc Photonics Summer School, Heriot Watt University, Edinburgh, UK on 23-30 June 2010.
- **BPI-DOST Top 6 Bachelor thesis nation-wide** Co-authored a thesis/research project that was awarded Bank of the Philippine Islands – Department of Science and Technology Best Project of the Year Award nationwide. The research is one of the top 6 finalists out of 29 researches carried out by final year undergraduates all over the country in 2008.

Professional and non-professional Activities

- Peer Reviewer for Optica (formerly Journal of Optical Society of America, JOSA) <https://www.optica.org/>
- Journals: Optics Letters, Optics Express, Applied Optics
- Co-founder and principal inventor of intellectual property for Tulon Photonics, an innovative laser technology startup currently in its foundational stages. In addition to my role as a key technology consultant, I contribute strategically as

- a board member, helping steer the company's vision and advancing cutting-edge laser solutions in the photonics field.
www.tulonphotonics.com
- Mentored a diverse group of students, including several interns and rotating PhD students, during my postdoctoral research with Onur Hosten at IST-Austria. I also supervised four PhD students, one of whom recently graduated.
 - Vyacheslav Li, PhD.: <https://doi.org/10.15479/at:ista:17225>
 - Supervised the completion of four Bachelor's theses and three Master's theses during my doctoral research under the mentorship of Jörg Schmiedmayer at TU Vienna.
 - Naz Shokrani, MSc.: <https://doi.org/10.34726/hss.2019.63488>
 - Thomas Weigner, MSc.: <https://doi.org/10.34726/hss.2018.58880>
 - Benedikt Gerstenecker, MSc.: <https://doi.org/10.34726/hss.2017.43723>
 - For over 30 years, I have played guitar and independently studied music theory and composition. This hobby complements my expertise in physics, offering insights into wave phenomena and harmonic analysis. On one occasion, it even contributed to advancing ultra-low-noise research.
 - Hands-on problem solver with a strong DIY approach. Whether in experiments or real-world challenges, I often take a direct approach to accelerate progress. My skill set includes machining, general electronics and analog circuit design and engineering, instrumentation programming, rf/microwave electronics, extreme data analysis, and various engineering tasks.
 - Outdoors: Mountaineering and Free-diving

References

- Prof.Dr. Onur Hosten, Post-Doc adviser, innovation co-inventor
 Group Leader: Quantum Sensing with Atoms and Light, Institute of Science and Technology Austria
 Email: onur.hosten@ist.ac.at
 Webpage: <https://hostenlab.pages.ist.ac.at/>
- Dr. Thorsten Schumm, CoQuS PhD. Thesis Advisory Committee and FFG spin-off advisor
 Group Leader: Thorium Nuclear Clock, Atominstitut TU Wien, Austria.
 Email: thorsten.schumm@tuwien.ac.at
 Webpage: <https://thoriumclock.eu/>
- Univ.Prof. Dipl.-Ing. Dr.techn. Jörg Schmiedmayer, PhD Supervisor
 Professor and Group Leader, Atomchip group, Atominstitut TU Wien, Austria.
 Email: schmiedmayer@atomchip.org
 Webpage: <http://atomchip.org/>

Publications and Patents

1. **F. Diorico**, O. Hosten, and IST-Austria Method for monitoring an optical signal extracted from an optical cavity
 US Patent App. 18/723,604: US20250070534A1, Jan 2025
<https://patents.google.com/patent/US20250070534A1/en>
2. S. Agafonova, U. Mishra, **F. Diorico**, O. Hosten Zigzag optical cavity for sensing and controlling torsional motion
 Physical Review Research 6 (1), 013141, Feb 2024
<https://doi.org/10.1103/PhysRevResearch.6.013141>
3. **F. Diorico**, A. Zhutov, O. Hosten Laser-cavity locking utilizing beam ellipticity: accessing the 10^{-7} instability scale relative to cavity linewidth, Optica 11 (1), 26-31, Jan 2024
<https://doi.org/10.1364/OPTICA.507451>
<https://www.linkedin.com/feed/update/urn:li:activity:7157704301459423232/>
4. **F. Diorico**, O. Hosten, and IST-Austria PCT - International Patent, WO2023118305, 2023
<https://patentscope.wipo.int/search/en/WO2023118305>
<https://patents.google.com/patent/WO2023118305A1/en?q=W02023118305A1>
5. U. Mishra, V. Li, S. Wald, S. Agafonova, **F. Diorico**, O. Hosten Monitoring and active stabilization of laser injection locking using beam ellipticity, Optics Letters 48 (15), 3973-3976, 2023
<https://doi.org/10.48550/arXiv.2212.01266>
<https://doi.org/10.1364/OL.495553>

6. S. Wald, **F. Diorico**, and O. Hosten, Analog Stabilization of an Electro-Optic I/Q Modulator with an Auxiliary Modulation Tone, arXiv:2208.11591v1 [physics.optics] , Applied Optics 62, 1, Jan 2023
<https://arxiv.org/abs/2208.11591>
<https://doi.org/10.1364/AO.474118>
7. **F. Diorico**, O. Hosten, and IST Austria A closed loop method and a system for controlling an injection-locked laser, European Patent: EP4336684A1, 2022
<https://patents.google.com/patent/EP4336684A1/en?q=EP4336684A1>
8. **F. Diorico**, O. Hosten, A robust modulation-free locking of a laser-cavity system, European Patent: EP4203206A1, 2021
<https://patents.google.com/patent/EP4203206A1/en?q=EP4203206A1>
9. V. Li, **F. Diorico**, and O. Hosten, Laser frequency offset locking at 10-Hz-level instability using hybrid electronic filters, arXiv:2111.13194v1 [physics.optics] , Phys. Rev. Applied 17, 054031, May 2022
<https://arxiv.org/abs/2111.13194>
<https://doi.org/10.1103/PhysRevApplied.17.054031>
10. C. Lévêque, **F. Diorico**, J. Schmiedmayer J., and A. Lode Many-body density and coherence of trapped cold bosons, arXiv:2006.10755 [cond-mat.quant-gas], SciPost Phys. under review (2021)
<https://arxiv.org/abs/2006.10755>
11. A. U. J. Lode, **F. Diorico**, R. Wu, P. Mognini, L. Papariello, R. Lin, C. Lévêque, L. Exl, M. Tsatsos, R. Chitra, N. Mauser, Many-body physics in two-component Bose-Einstein condensates in a cavity: fragmented superradiance and polarization, arXiv:1801.09448, New Journal of Physics (Spotlight on Multicomponent Quantum Matter) Vol. 20, May 2018
<https://arxiv.org/abs/1801.09448>
<https://doi.org/10.1088/1367-2630/aabc3a>
12. **F. Diorico**, S. Minniberger, B. Gerstenecker, T. Weigner, N. Shokrani, Z. Kurpias, J. Schmiedmayer, Current-induced magnetization hysteresis defines atom trapping in a superconducting atomchip, arXiv:1803.08115 [physics.atom-ph], SciPost Phys. 4, 036 (2018)
<https://arxiv.org/abs/1803.08115>
<https://doi.org/10.21468/SciPostPhys.4.6.036>
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https://doi.org/10.1007/978-3-030-13325-2_6
14. **F. Diorico**, Novel AtomChip Technologies with Superconductors
 PhD. Dissertation, reposiTUM, Technische Universität Wien, 2016
<http://hdl.handle.net/20.500.12708/7981>
<https://doi.org/10.34726/hss.2016.21603>
15. Minniberger*, S., **F. Diorico***, S. Haslinger, C. Hufnagel, C. Novotny, N. Lippok, J. Majer, C. Koller, S. Schneider, J. Schmiedmayer, Magnetic conveyor belt transport of ultracold atoms to a superconducting atomchip, Applied Physics B, 2014. 116(4):p. 1017-1021, 2014
<https://doi.org/10.48550/arXiv.1311.3155>
<https://doi.org/10.1007/s00340-014-5790-5>
 These authors contributed equally to the publication of this paper.

See my google scholar profile for a full list of academic publications:

https://scholar.google.com/citations?hl=en&user=bLh5Ur4AAAAJ&view_op=list_works&sortby=pubdate