

Walid Abdelhalim REDJEM

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CURRENT POSITION

Empire Innovation Assistant Professor Jan 2024 –
 Department of Nanoscale Science & Engineering
 College of Engineering and Applied Science
 State University of New York at Albany

PREVIOUS POSITION

Postdoctoral fellow & Lab manager, Laboratory of Dr. February 2020 – Dec 2023
 Boubacar KANTE
 Department of electrical engineering and computer
 sciences, University of California, Berkeley

EDUCATION

Ph. D. Candidate, Department of Physics, Laboratory Charles Nov 2016 – Jan 2020
 Coulomb, University of Montpellier, FRANCE
Thesis: "Optical properties of silicon color centers: from ensemble to single center"
Advisors: Guillaume Cassabois and Vincent Jacques

Master of physics and quantum devices, Department of 2013 – 2016
 Physics, Quantum Materials and phenomena laboratory,
 University of PARIS Diderot & Ecole normale superieure,
 France

Bachelor of physics, University of Montreal, CANADA 2012 – 2013

Bachelor of Math & Physics, University of Nice-Sophia 2010 – 2012
 Antipolis, FRANCE

RESEARCH EXPERIENCE

Kante lab, University of California, Berkeley, USA

- Working to demonstrate scalable single mode laser base on open-Dirac electromagnetic aperture.
- Collaboration with Thomas Schenkel for the formation of silicon color center using intense ion pulse.
- Simulation and characterization of topological cavities for lasers and third-harmonic generation.
- Exceptional point plasmonic metasurface simulation, theory and characterization.

Laboratory Charles Coulomb, University of Montpellier, FRANCE

- Developed a cryogenic near-infrared confocal microscope for the characterization of single emitter in silicon.
- Spectroscopy of single integrated quantum dot emitter in the telecommunication wavelength.
- Fabrication and optical characterization of photonic crystal cavity base on bound state in the continuum cavity.

Laboratory of theoretical physics and high-energy, PARIS, FRANCE

- Synthesis of solution containing low density of nanocrystal CdS/CdSe.
- Autocorrelation measurements of single nanocrystal for single photon emission, and shape-dependent blinking effect.
- Coupling of single nanocrystals to nano-waveguide.

Materials and phenomena laboratory, PARIS, France

- Theoretical model for the prediction of the conductivity of graphene

TEACHING AND MENTORING

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| University of Montpellier, <i>Teaching assistant</i> Introduction to quantum mechanics Introduction | Fall 2019 |
| University of Montpellier, <i>Teaching assistant</i> Newtonian physics | Spring, Fall 2018 |
| University of Montpellier, <i>Teaching assistant</i> Ray optics for graduate | Spring, Fall 2018 |
| University of Montpellier, <i>Teaching assistant</i> Experimental physics | Spring, 2017 – 2018 |
| University of Montpellier, <i>Teaching assistant</i> Experimental physics | Spring, Fall 2017 – 2018 |
| University of Montpellier, <i>Teaching assistant</i> Ray optics for undergraduate | Fall 2018 |
| University of Paris, <i>Tutor</i> Mathematics for high school | Oct. 2015 – August 201 |
| University of Paris, <i>Tutor</i> Mathematics and Physics for mid-school | Sept. 2014 – July 2015 |
| University of Nice-Sophia Antipolis, <i>Tutor</i> Physical science for high school | Nov. 2011 – Jun. 2012 |

- Undergraduate mentoring, Master student. Led to master thesis with honor, “Study the effect of the irradiation dose on the optical properties of silicon and its defects”
- Graduate mentoring, The effect of proton irradiated silicon on photonic crystal and nanopillars. Study that led to a conference paper.
- Graduate mentoring, in the Kante’s group Haoye Qin that led to a publications
- Graduate mentoring in the Kante’s group Yertay Zhiyenbayev that led to XX publications

Selected Publications

- **Walid Redjem***, Durand, A.*, Herzig, T. et al. “*Single artificial atoms in silicon emitting at telecom wavelengths*”. Nat Electron **3**, 738–743 (2020).
- Rushin Contractor*, Wanwoo Noh*, **Walid Redjem***, Wayesh Qarony, Emma Martin, Scott Dhuey, Adam Schwartzberg, Boubacar Kanté, *Scalable single-mode surface emitting laser via open-Dirac singularities*, Nature, 1-2 (2022)
- **Redjem, W.**, Zhiyenbayev, Y*., Qarony, W*. et al. *All-silicon quantum light source by embedding an atomic emissive center in a nanophotonic cavity*. Nat Commun **14**, 3321 (2023).
- Clément Beaufils, **Walid Redjem**, Emmanuel Rousseau, Vincent Jacques, A Yu Kuznetsov, Christophe Raynaud, C Voisin, A Benali, T Herzig, S Pezzagna, J Meijer, Marco Abbarchi, Guillaume Cassabois, *Optical properties of an ensemble of G-centers in silicon*, Physical Review B, **97**,3, 035303 (2018)
- **Redjem, W.**, Amsellem, A.J., Allen, F.I. et al. *Defect engineering of silicon with ion pulses from laser acceleration*. Nature Commun Mater **4**, 22 (2023).
- Yertay Zhiyenbayev*, **Walid Redjem***, Vsevolod Ivanov, Wayesh Qarony, Christos Papapanos, Jacopo Simoni, Wei Liu, Kaushalya Jhuria, Liang Z Tan, Thomas Schenkel, Boubacar Kanté, *Scalable manufacturing of quantum light emitters in silicon under rapid thermal annealing*, Optics Express **31**, 5, 8352-8362
Thomas Schenkel*, **Walid Redjem***, Arun Persaud, Wei Liu, Peter A Seidl, Ariel J Amsellem, Boubacar Kanté, Qing Ji, *Exploration of defect dynamics and color center qubit synthesis with pulsed ion beams*, Quantum Beam Science MDPI **6** 1, 13
- Alrik Durand, Yoann Baron, **Walid Redjem**, T Herzig, A Benali, S Pezzagna, J Meijer, A Yu Kuznetsov, J-M Gérard, Isabelle Robert-Philip, M Abbarchi, Vincent Jacques, Guillaume Cassabois, Anaïs Dréau, *Broad diversity of near-infrared single-photon emitters in silicon*, Physical Review Letters (2021), **126**,8, 083602
- Ali Jaffal, **Walid Redjem**, Philippe Regreny, Hai Son Nguyen, Sébastien Cueff, Xavier Letartre, Gilles Patriarche, Emmanuel Rousseau, Guillaume Cassabois, Michel Gendry, Nicolas Chauvin, *InAs quantum dot in a needlelike tapered InP nanowire: a telecom band single photon source monolithically grown on silicon*, Nanoscale, **11**,45, 21847-21855 (2019)

- Haoye Qin, **Walid Redjem**, Boubacar Kante, *Tunable and enhanced optical force with bound state in the continuum*, Optics Letters (2022), 47,7, 1774-1777
- Effect of Localization on Photoluminescence and Zero-Field Splitting of Silicon Color Centers, Vsevolod Ivanov, Jacopo Simoni, Yeonghun Lee, Wei Liu, Kaushalya Jhuria, **Walid Redjem**, Yertay Zhiyenbayev, Wayesh Qarony, Boubacar Kante, Arun Persaud, Thomas Schenkel, Liang Z Tan, Phys. Rev. B 106, 134107 (2022)
- Zhetao Jia, Wayesh Qarony, Jagang Park, Sean Hooten, Difan Wen, Yertay Zhiyenbayev, Matteo Seclì, **Walid Redjem**, Scott Dhuey, Adam Schwartzberg, Eli Yablonovitch, Boubacar Kanté, *Interpretable inverse-designed cavity for on-chip nonlinear photon pair generation*, Optica Vol. 10, Issue 11, pp. 1529-1534 (2023)
- Tobias Herzig, Paul Räcké, Nicole Raatz, Daniel Spemann, **Walid Redjem**, Jürgen W Gerlach, Jan Meijer, Guillaume Cassabois, Marco Abbarchi, Sébastien Pezzagna, *Creation of quantum centers in silicon using spatial selective ion implantation of high lateral resolution*, 2018 22nd International Conference on Ion Implantation Technology (IIT)
- Zhetao Jia, Matteo Seclì, Alexander Avdoshkin, **Walid Redjem**, Elizabeth Dresselhaus, Joel Moore, Boubacar Kanté, *Disordered topological graphs enhancing nonlinear phenomena*, Sci. Adv. 9, 14 (2023)

INVITATED PRESENTATION

- ICPS (July 29 to August 3, 2018 - Montpellier FRANCE), *Optical properties of G-centers*.
- German French Korean Workshop (October 15 to 18, 2017 - Sète FRANCE), *Optical properties of G-centers*.
- CECAM school-workshop Qubit (July 9 to 13, 2018 – Bremen GERMANY)
- Frontiers in Optics, Single color center optical properties under rapid thermal annealing
- CIQC, *Discovery of single artificial atom in silicon*, UC Berkeley
- Solid state seminar,
- *Discovery of single artificial atoms in silicon*, Quantum optoelectronic seminar, MIT Boston

AWARDS AND FELLOWSHIP

- Fellowship from the French minister of research and science
- CIQC seed funding, *Scalable quantum optics in silicon*
- Best dissertation awards: University of Montpellier

LEADERSHIP AND COMMUNITY SERVICE

Reviewed papers for IEEE photonics, Optics Express, Nature physics

Organizing committee and Invited speaker “International Conference on Optics, Photonics and Lasers

Part of the Xperience at University of California, Berkeley, that help students get familiarized with experimental setup

REFERENCES

- **Prof. Guillaume CASSABOIS** – Laboratory Charles Coulomb - Université de Montpellier Email: guillaume.cassabois@umontpellier.fr, phone: (+33) 467143756
- **Associate Prof. Boubacar Kante** – UC Berkeley, EECS. Email: bkante@berkeley.edu, phone: 510-664 5124
- **Dr. Thomas Schenkel** - Senior scientist and head of the Fusion Science and Ion Beam Technology Program in the Accelerator Technology and Applied Physics Division. Email: t_schenkel@lbl.gov, phone: 510-387-2837
- **Prof. Iacopo Carusoto**, University of Triento ITALY,
- **Prof. Eli Yablonovitch** – *University of California, Berkeley. Email: eliy@berkeley.edu, phone: +1(510)642-6821*