

Hichem Eleuch

Citizenship: Canadian

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Contact Number: +971 50 3410769

Research Interests: Quantum Optics, Quantum Computing, Mathematical Physics,
Complex Systems and Applications.

Education

Sept 1995 - June 1998 **PhD** in Quantum Physics. *Kastler Brossel Laboratory**
Ecole Normale Supérieure (ENS) / University Pierre and Marie Curie
Title: Theoretical study of quantum fluctuations in emitted light from semiconductor microcavities.

Supervisors: Prof. Elisabeth Giacobino and Prof. Claude Fabre

Sept 1995 Equivalence of DEA (Master Degree) in Quantum Physics
Ecole Normale Supérieure (ENS)

1989 - 1995 **Diploma**, Electric and Information Engineering (equivalent to Master Degree)
Technical University of Munich, Germany
Title of the Diploma Thesis (Diplomarbeit = Master Thesis): Electromagnetically induced transparency due to Laser driven three-level atoms.

Supervisors: Prof. Peter Russer (*Technical University of Munich*)
Prof. Axel Schenzle (*Ludwig Maximilian University and Max Planck Institute for Quantum Optics*)

Additional Qualifications:

June 2004 **Habilitation:** Fluctuations, correlations, and non-linearities in quantum optics and applications

*The Kastler Brossel laboratory is home to three Nobel Prizes in Physics, namely: S. Haroche (2012), C. Cohen Tannoudji (1997) and A. Kastler (1966).

Professional Experience

- Sep 2020 - Present **Full Professor**, University of Sharjah, Sharjah, UAE
- Jan 2018 - Aug 2020 **Full Professor**, Abu Dhabi University, Abu Dhabi, UAE
- Aug 2017 - Jan 2018 Visiting Full Professor, Abu Dhabi University, Abu Dhabi, UAE
- Jan 2010 - Present **Full Professor**, University of Carthage
- May 2016 - Aug 2017 TEES Research Associate Professor, Institute of Quantum Science and Engineering
Texas A&M University, College Station, Texas, USA
- Oct 2013 - Mar 2016 Visiting Professor, Department of Physics, *McGill University*, Montreal, Canada
- Nov 2014 - Aug 2015 Invited Researcher, Department of Physics, *University of Montreal*, Canada
- Jul 2012 - Jul 2013 Invited Researcher, Research Group of **Prof. Gilles Brassard** (Quantum Inf. Processing),
University of Montreal, Canada
- Jun 2011 - Jun 2012 Guest Scientist, *Max Planck Institute for the Physics of Complex Systems*
Dresden, Germany
- Sep 2008 - Sep 2010 Researcher, Institute for Quantum Studies/Institute of Quantum Science and Engineering,
(Research Group of **Prof. M. O. Scully**, *Texas A&M University*, College Station
Visiting Scientist, *Princeton University*, Princeton, New Jersey, USA
- Jan - Apr 2008 **Fulbright Scholarship**, Institute for Quantum Studies, *Texas A&M University*, College
Station, Texas, Research groups of **Prof. M. O. Scully** and **Prof. M. S. Zubairy**.
- Sep 2004 - Jan 2010 Associate Professor, University of Carthage.
National Institute of Applied Sciences and Technology, Tunis, Tunisia (Institut National des
Sciences appliquées et de Technologie, INSAT)
- Nov 2006 - 2007 **Scientific Consultant** at the **National Center for Nuclear Sciences and Technologies**,
Tunis, Tunisia
(Centre National des Sciences et Technologies Nucléaires CNSTN).
- Jan - Apr 2006 Visiting Scientist, Quantum Optics research group of **Prof. H. Carmichael**, **University
of Auckland**, Auckland, New Zealand
- 2003 - 2006 Associate Researcher, **National Center for Nuclear Sciences and Technologies**
Tunis, Tunisia
- 1999 - 2004 Assistant Professor INSAT, University of Carthage
- 1998 - 1999 Adjunct - Assistant Professor
INSAT, University of Carthage
- 1998 - 2002 Adjunct - Assistant Professor
Ecole Polytechnique (EPT) Tunis, Tunisia
- 2001 - 2003 Adjunct - Assistant Professor
Institute of Higher Studies Tunis, Sousse and Sfax, Tunisia
(L'Institut des Hautes Etudes, IHE)
- 2001 - 2003 Adjunct - Assistant Professor, Faculty of Economic Science and Management Sfax, Tunisia
(Faculté des Sciences Economiques et de Gestion, FSEG)
- 1995 - 1997 Adjunct - Lecturer, University of Cergy-Pontoise, Paris, France

Awards and Honors

2021-	Member of the Mohammed bin Rashid Academy of Scientists, UAE
2019-	Fellow of the African Academy of Sciences
2019-2020	Research Award, Abu Dhabi University, UAE
2018	Research Fellow Award, Abu Dhabi University, UAE
June 2011 - 2012	Guest Scientist, Max Planck Institute for the Physics of Complex Systems, Germany
Jan - Apr 2008	Fulbright Scholarship <i>Council for International Exchange of Scholars and United States Department of State, USA</i>
2006 - 2013	Regular Associate Member, International Center of Theoretical Physics Trieste, Italy
Sep 1995 - Jul 1998	Laureate Fellowship for PhD, <i>Ministry of Research and Higher Education of Tunisia</i>
Sep 1989 - Jun 1995	Laureate Fellowship for engineer studies (+1 year German Language) DAAD (<i>Germany</i>) and <i>Ministry of Research and Higher Education of Tunisia</i>

Publications

- Over 200 publications in peer reviewed journals (see the list of publications below)
- More than 40 invited talks
- Participated in over 70 international conferences
- 3 US Patent + 4 Patents (Applied to the United States Patent and Trademark Office).
- H-factor: 37 (Web of Science), 38 (Scopus), 40 (Google Scholar)
- Among the top 2 % scientists in the field of general physics (Stanford University's List) for the career-long and for the year 2019
<https://drive.google.com/file/d/1bUJrvurVVBbxS19eFZRSHFif7tt30-5U/view>
<https://data.mendeley.com/datasets/btchxktzyw/2>

Nine selected publications

1. "Hybrid Two-Mode Squeezing of Microwave and Optical Fields Using Optically Pumped Graphene Layers"
M. Qasymeh and H. Eleuch, *Scientific Reports* **10**, 16676 (2020)
2. "Quantum plasmonic control of trions in a picocavity with monolayer WS₂"
Z. He, Z. Han, J. Yuan, A. M. Sinyukov, H. Eleuch, C. Niu, Z. Zhang, J. Lou, J. Hu, D. V. Voronine, and M. O. Scully, *Science Advances* **5**, EAAU8763 (2019)
3. "Quantum Microwave-to-Optical Conversion in electrically driven Multilayer Graphene"
M. Qasymeh and H. Eleuch, *Optics Express* **25**, 5945 (2019)
4. "Probing Anderson localization using the dynamics of a qubit"
H. Eleuch, M. Hilke, and R. MacKenzie, *Phys. Rev. A* **95**, 062114 (2017)
5. "High-efficiency quantum state transfer and quantum memory using a mechanical oscillator"
E. A. Sete and H. Eleuch, *Phys. Rev. A* **91**, 032309 (2015)
6. "Localization and delocalization for strong disorder in one-dimensional continuous potentials"
H. Eleuch and M. Hilke, *New J. Phys.* **17**, 083061 (2015)
7. "Effects of an external environment on a cavity quantum electrodynamics system controlled by bichromatic adiabatic passage", H. Eleuch, S. Guérin, and H. R. Jauslin, *Phys. Rev. A* **85**, 013830 (2012)
8. "Excitation of Atomic Coherence Using Off-Resonant Strong Laser Pulses",
Y. Rostovstev, H. Eleuch, A. Svidzinsky, H. Li, V. Sautenkov and M. O. Scully, *Phys. Rev. A* **79**, 063833 (2009)
9. "Optical Bistability in Semiconductor Microcavities"
A. Baas, J. Ph. Karr, H. Eleuch and E. Giacobino, *Phys. Rev. A* **69**, 023809 (2004)

Patents

1. Frequency-Tunable Quantum Microwave to Optical Conversion System, M. Qasymeh and H. El Euch.
Patent No: US 10,824,048 B2. Date of the Patent Publication: Nov. 3, 2020.
(Supported by TAKAMUL for patent filling, Abu Dhabi Department of Economic Development, 50 000 AED).
2. Wideband Graphene-Based Electro-Optic Entangler, M. Qasymeh and H. El Euch
Patent No: US 11,048,107 B2. Date of the Patent Publication: June. 29, 2021.
3. Novel Quantum Random Access Memory, H. El Euch, M. Zidan, M. Abdel-Aty, A. H. Abdel-Aty, A. Khalil
Patent No: US 11,093,850 B1. Date of Publication: August 17, 2021.
4. Graphene Multi-Layered Structure for ultra-sensitive microphotonic devices with microvolts inputs
M. Qasymeh and *H. El Euch*
US2020/0319525 A1 (Applied to US Patent Office)
5. Optically Activated Graphene-Based Microwave Field Squeezer, M. Qasymeh and H. El Euch
(Applied Patent to the United States Patent and Trademark Office).
6. Coherent Microwave transmission without refrigeration at room temperature, M. Qasymeh and *H. El Euch*
(Applied Patent to the United States Patent and Trademark Office).
7. Quantum Teleportation Using Microwave Enabled Plasmonic Graphene Waveguide
M. Qasymeh, M. Asjad and *H. El Euch*
(Applied Patent to the United States Patent and Trademark Office).

<h2>Reviewer</h2>

Mathematics

- Mathematical Reviews (American Mathematical Society); Zentral Blatt MATH
- Mathematics; Axioms; Journal of Mathematical Physics
- Applied Mathematics and Computation; Mathematical and Computational Applications
- Numerical Methods for Partial Differential Equations
- Neuronal Computing and Applications; Applied Mathematics & Information Sciences; Journal of Number Theory

Physics

- Nature Communications; Scientific Reports
- Physical Review Letters; Physical Review A; Physical Review B; Physical Review Applied; Physical Review Research
- Annals of Physics; Nanomaterials; Physics Letters A; Optics Express
- Proceedings of the Royal Society A; Journal of the Optical Society of America B; Sensors; Photonics
- Laser Physics Letters; Laser Physics; Solid State Communications; European Journal of Physics D
- Optics Communications; Journal of Modern Physics; European Physical Journal Plus
- Fortschritte der Physik - Progress of Physics; Optics & Laser Technology; Physica A; Physica E
- Member of the IAA (International Academy of Astronautics) Program Committee 22nd IAA Humans in Space Symposium
- Molecular Physics; Frontiers of Physics; Canadian Journal of Physics; Few Body Systems

- International Journal of Theoretical Physics; Energies; Chaos, Solitons & Fractals; Energy Reports
- International Journal of Modern Physics B
- Results in Physics; Invited Editor for Frontiers in Physics special issue.
- Entropy; Invited Guest Editor for the Special Issue on "Coherence in Open Quantum Systems", Entropy
- Modern Physics Letters B; Invited editor for Computer Communications special issue;
- International Journal of Quantum Information; Guest editor for Applied Sciences special issue.
- Chinese Physics B; Crystal
- Optical Review
- Optik; Acta Physica Polonica B
- International Journal of Nanoscience; Journal of Communication
- Nuclear Science and Techniques; Neural Computing and Applications
- Open Physics; Asian Journal of Spectroscopy; Information
- SETIT-IEEE Conferences
- MITACS (Canadian Funding Agency); Research project evaluation at Sharjah University, UAE

Grants Received in the Last 7 Years

- 2021-2024, Fundamental Research Grant Scheme (FRGS), Ministry of Higher Education, Malaysia, "*Theory for Entanglement in a Quad Guided Waves Quantum Coupler with Kerr Nonlinearity.*", 120 000 RM (Collaborator).
- 2019-2022, Abu Dhabi Award for Research Excellence 2019, "*AARE19-062 Graphene-Based Modulator for Passive Transmission and White Light Communications*", 985 000 AED (PI until August 2020 and then became a CO-Pi due to my move to the University of Sharjah).
- 2021-2022, "Renewable Energy Transfer and Quantum Correlations in Realistic Quantum Confined Systems", funding from King Abdulaziz University, SA; 100 000 RS (Co-Pi).
- 2021 "*Atomic population inversion in a two-level atom for shaped and chirped laser pulses*" Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 40 000 AED (Co-Pi).
- 2020 "*Quantum sensor: Detecting topological edge states with the dynamics of a qubit*" Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 50 000 AED (PI).
- 2020 "*Design of Optimal Quantum Circuits*" Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 50 000 AED (PI).
- 2019 Funding from TAKAMUL for patent filling, Department of Economic Development, Abu Dhabi, 50 000 AED.
- 2020 "*Experimental Realization of Microwave and Photonic Quantum Entanglement*" Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 50 000 AED (Co-PI).

- 2020 “*Analytic Solutions of Solitary Waves in Three-Level Unbalanced Dense Media*” Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 20 000 AED (Co-PI).
- 2020 International Partnership Research Grant, Funding from Prince Sattam Bin Abdulaziz University Saudi Arabia; 110 000 RS (Co-PI).
- 2019 “*Quantum correlations and coherence in a driven two-qubit system in non-Markovian environment*” Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 20 000 AED (PI).
- 2019 “*Exceptional points and non-linearity in open quantum systems*” Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 20 000 AED (PI).
- 2019 “*Analytical solutions to the Schrödinger equation with a short-range potential and applications to nuclear science*” Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 25 000 AED (Co-PI).
- 2018 “*Planetary exploration Physical conditions and simulations*” Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 20 000 AED (PI).
- 2018 ”*Dynamics in terahertz semiconductor microcavity quantum noise spectra*” . Funding from the Office of Research & Sponsored Programs, Abu Dhabi University, Abu Dhabi, UAE; 20 000 AED (PI).
- 2018 “*Using Quantum Algorithms to Solve Travelling Salesman Problem*” Funding from The Office of Research & Sponsored Programs (Center of Excellence), Abu Dhabi University, Abu Dhabi, UAE; 35 000 AED (Co-PI).
- 2018 “*Q-deformed function, q-calculus, quantum asymmetries and their applications*” Funding from the Office of Research & Sponsored Programs (Faculty Research Incentive Grant), Abu Dhabi University, Abu Dhabi, UAE; 20 000 AED (Co-PI).
- 2018 “*Novel Graphene-Based Information Transmission Systems*” Funding from The Office of Research & Sponsored Programs (Center of Excellence), Abu Dhabi University, Abu Dhabi, UAE; 40 000 AED (Co-PI).
- 2016-2018 Funding from King Fahd University of Petroleum and Minerals, Saudi Arabia; 135 000 Rs (Scientific Consultant).
- 2016 ”*New Quantum Correlations and Novel Quantum Models*” Funding from University Prince Sattam Bin Abdulaziz University, Saudi Arabia; 100 000 Rs (Co-PI).
- 2015 Funding from INTRIQ(Institut Transdisciplinaire d’Information Quantique: Transdisciplinary Institute for Quantum Information, Quebec, Canada): 36 000 CA\$ (PI).
- 2014 Funding from Prince Sattam Bin Abdulaziz University Saudi Arabia; 50 000 Rs= 13 333.87 \$ (Co-PI).
- 2014 Funding from INTRIQ (Canada): 9 000 CA\$ (Co-PI).

Collaborators, Last 7 Years (Selected list)

- M. O. Scully, Texas A&M University and Princeton University
- I. Rotter, Max Planck Institute for the Physics of Complex Systems
- M. Hilke, McGill University
- V. Hussein, University of Montreal
- R. Mackenzie, University of Montreal
- Y. V. Rostovtsev, North Texas University
- S. Suckewer, Princeton University
- P. K. Jha, University of Berkely
- C .H. R. Ooi, University of Malaya, Kuala Lumpur
- S. Das, Niels Bohr Institute
- H. R. Jauslin, S. Guerin, University of Bourgogne
- A. Prasad, University of Delhi
- H. Bahlouli, King Fahd University of Petroleum and Minerals

MS and PhD Dissertations Supervised and Post-docs Monitored

Post-docs

- Muzzamal Iqbal Shaukat (July 2020-present)
- Mohammed Zidan (June 2020-Present)
- Ali Homid (September-December 2020)
- Muhammed Asjad (January 2021-present)

Institute of Quantum Science and Engineering (Texas A&M University)

(Monitored) May 2016 - Aug 2017

- Tuguldur Begzjav (PhD student at Texas A&M University, College Station, Texas)
- Han Cai (PhD student at Texas A&M University, College Station, Texas)
- Sheng-Wen Li (Post-doc researcher at Texas A&M University, College Station, Texas)
- Reed Nessler (Post-doc researcher at Texas A&M University, College Station, Texas)

Department of Mathematics (University of Montreal)

Sep 2012 - Jun 2013

Masters Thesis Monitored

- Anaëlle Hertz (Currently a PhD student at Centre for Quantum Information and Communication, École Polytechnique, Université Libre de Bruxelles, Bruxelles, Belgium)

PhD Theses Monitored

- Pankaj Jha (Currently a Postdoc at University of California, Berkeley)
- Eyob Sete (Currently a Senior Research Scientist Rigetti Quantum Computing, Berkeley, California)
- Dong Sun (Currently a Research Fellow at Nanyang Technological University, Singapore)
- Luqi Yuan (Currently a Postdoc at Stanford University, California)

Postdoc Monitored

Jan - Aug 2010

- Sumanta Das (Currently an Assistant Professor at Niels Bohr Institute, Copenhagen University)

Faculty of Sciences Tunis (FST)

Masters Theses Supervised and Co-Supervised

- Ghassen Dridi, 2007 (Postdoc at Ecole Polytechnique, Paris)
- Imen Hassini, 2007 (Teacher at Secondary School Beja, Tunisia)
- Riadh Rebhi, 2004 (Research Fellow at Center for Quantum Technologies, National University of Singapore)
- Nidhal Fraj, 2004
- Jamel Jouini, 2003
- Houchem Jabri, 2002 (Assistant Professor at University of Carthage, Tunisia)
- Nader Rachid, 2001 (Assistant Professor at University of Carthage, Tunisia)
- Belhassen Chamkhi Attaya, 2000 (Training Manager at Nokia Siemens Networks, Tunisia)
- Samia Hadded, 1999 (Assistant Professor at University of Carthage, Tunisia)

INSAT (National Institute of Applied Science and Technology)

Masters Theses Supervised

- Khalil Ben Fredj, 2008 (Medical Physicist at Hospital Ennasr, Tunis)
- Arbi Mejri, 2007 (Radiation Security Engineer at National Center for Nuclear Sciences and Technologies, Tunisia)
- Slim Ben Othman, 2004 (Assistant at University El Manar, Tunisia)

University of Stuttgart (Germany)

Masters Thesis Supervised

2004

- Dominique Elser (Researcher at Max Planck Institute for the Science of Light, University of Erlangen-Nuremberg, Germany)

Faculty of Economic Sciences and Management, Sfax, Tunisia

Co-Supervised Masters Theses (Finance)

2002

- Souha Boutouria
- Nadia Ben Hamida
- Jihéne Rebai

PhD Theses Supervised

- Housseem Jabri, 2008 (Assistant Professor at University of Carthage)
- Arbi Mejri, 2014 (Researcher at National Center for Nuclear Sciences and Technologies, Tunisia)
- M. Ali Amdouni, 2016 (Lecturer at Preparatory Engineering Institute, Bizerte, Tunisia)

Membership in Scientific Committees

2021-	Member of the Mohammed bin Rashid Academy of Scientists, UAE
2021 -	Member of Sigma Xi, The Scientific Research Honor Society, USA.
2019-	Fellow of the African Academy of Sciences
2019 - 2020	Member in National Committee for EmSAT Physics, Ministry of Education, UAE
2016 - 2017	Member in Program Committee for Quantum Africa 4
2006 - 2013	Regular Associate Member, Abdus Salem International Centre of Theoretical Physics Trieste, Italy
Nov 2006 - 2007	Scientific Consultant , National Center for Nuclear Sciences and Technologies, (Tunis, Tunisia) (Centre National des Sciences et Technologies Nucléaires (CNSTN))
Jan 2003 - Nov 2006	Associate Researcher to the National Center for Nuclear Sciences and Technologies (Tunis, Tunisia)
May 2005 - Sep 2008	University board member representative of Associate and Full Professors Member of internal committee for educational new reform for Bachelor-Master-PhD studies Member of internal committee for research University of Carthage, Tunisia

Pedagogical Materials

I published three manuals (internal publications) for the 1st year students at INSAT:

- Course of Electricity for 1st year in Chemistry and Biology
- Course of Mechanics for 1st year in Chemistry and Biology
- Course of Optics for 1st year in Mathematics-physics

Teaching Experience

Graduate Level Courses:

Sept - Dec 2012	Fundamental concepts of photonics (For Graduates and Undergraduates) Ecole Polytechnique, Montreal
March 2012	Stochastic Differential Equations and Integral Equations Master of Finance, IHEC, Sfax/Tunisia
2004 - 2008	Quantum Mechanics, Master of Measurement and Instrumentation INSAT, University of Carthage, Tunisia
2001 - 2003	Variation Calculus (Modeling and Optimization), Master of Operational Research FSEG, Tunisia
2000 - 2001	Laser Physics and Applications, DEA (=Master) Measurement and Instrumentation INSAT, University of Carthage TD (=Recitation/Tutorial) Quantum Mechanics, DEA (=Master) Measurement and Instrumentation INSAT, University of Carthage
2001 - 2004	TD Quantum Mechanics, Master of Measurement and Instrumentation, INSAT, University of Carthage

- 2001 - 2002 Invited Course Seminar: Differential Equations and Stochastic Differential Equations for
Researchers in the field of Finance
FSEG, Tunisia
- 2002 - 2003 Differential Equations and Stochastic Differential Equations
Master of Finance
IHE, Tunisia
- 2000 - 2008 Laser and Optronics
5th year Measurement and Instrumentation engineering
INSAT, University of Carthage

Undergraduate Level Courses:

- Feb - Apr 2006 Basic Concepts in Physics
(12 Lectures) University of Auckland, New Zealand
- Sept 2021 - Quantum Mechanics 1
University of Sharjah
- Jan-June 2021 Quantum Mechanics 2
University of Sharjah
- Sep 2020 - Remedial Physics
University of Sharjah
- 2017 - 2020 Physics 102 (Mechanics)
1st year engineering, Abu Dhabi University, UAE
Physics 201 (Electricity and Magnetism)
1st year engineering, Abu Dhabi University, UAE
- 1998 - 2008 Physics I (Electricity)
1st year Chemistry and Biology (CBA), INSAT, University of Carthage
- 1998 - 2008 Physics II (Mechanics)
CBA, INSAT, University of Carthage
- 1998 - 2001 Optics
1st year Mathematics-Physics (MPI), INSAT, University of Carthage
- 1999 - 2008 Laboratory course in Physics I
CBA, INSAT, University of Carthage
- 1998 - 2002 TD (=Recitation/Tutorial) Waves and Fields
3rd year Engineering Ecole Polytechnique (EPT) Tunis, Tunisia
- 1998 - 2001 TD Quantum Mechanics and Statistical Physics
3rd year Engineering Ecole Polytechnique (EPT) Tunis, Tunisia
- 1999 - 2000 TD Semiconductors
3rd year Engineering Ecole Polytechnique (EPT) Tunis, Tunisia
- 1999 - 2004 Laboratory course in Physics II
CBA, INSAT, University of Carthage
- 1995 - 1997 Laboratory courses in Mechanics and Electricity
1st Year DEUG, University of Cergy,Pontoise, France

List of Publications

Papers in Physics and Mathematics

- 1. Highlighting a common confusion on the computation of capacitance of electrochemical energy storage devices**
Anis Allagui, Ahmed Elwakil, and *H. Eleuch*
The Journal of Physical Chemistry C **125**, 9591 (2021).
- 2. Tripartite entropic uncertainty relation under phase decoherence**
R. A. Abdelghany, A.-B. A. Mohamed, M. Tammam, Watson Kuo, and *H. Eleuch*
Scientific Reports **11**, 11830 (2021).
- 3. Efficient Quantum Gates and Algorithms in an Engineered Optical Lattice**
A. H. Homid, M. Abdel-Aty, M. Qasymeh and *H. Eleuch*
Scientific Reports **11**, 15402 (2021).
- 4. Continuous-variable quantum teleportation using a microwave-enabled plasmonic graphene waveguide**
M. Asjad, M. Qasymeh and *H. Eleuch*
Physical Review Applied **16**, 034046 (2021).
- 5. Non-Locality Dynamics Induced by a Lamb-Dicke Nonlinearity in Two Dipole-Coupled Trapped Ions Under Intrinsic Decoherence**
Abdel-Haleem, A.-B. A. Mohamed, and *H. Eleuch*
Accepted in: *Fractals* (2021).
- 6. A Novel Efficient Quantum Random Access Memory**
M. Zidan, A. H. Abdel-Aty, A. Khalil, M. Abdel-Aty and *H. Eleuch*
Accepted in: *IEEE Access* (2021)
- 7. Wigner function non-classicality induced in a qubit interacting with a dissipative magnetic field cavity**
A.-B. A. Mohamed, E. M. Khalil, A. Y. AL-Rezami and *H. Eleuch*
Symmetry **13**,802 (2021)
- 8. Quantumness measures for a system of two qubits interacting with a field in the presence of the time-dependent interaction and kerr medium**
Sayed Abdel-Khalek, Kamal Berrada, Eied. M. Khalil, A.-S. F. Obada, Esraa Reda, and *H. Eleuch*
Entropy **23**, 635 (2021).
- 9. Atomic Population Inversion in a Two-Level Atom for Shaped and Chirped Laser Pulses: Exact Solutions of Bloch Equations with Dephasing**
S. Grira, N. Boutabba, and *H. Eleuch*
Results in Physics **26**, 104419 (2021).
- 10. Unconventional photon blockade in quantum-well microcavities with squeezed light**
H. Jabri and *H. Eleuch*
Accepted in: *Physica Status Solidi B* (2021).
- 11. Dynamics of two coupled qubit-systems in a two-mode cavity: Quantum coherence under intrinsic noise**
A.-B. A. Mohamed, E. M. Khalil, and *H. Eleuch*
Solid State Communications **336**, 114383 (2021).
- 12. The Quantum Kerr Nonlinear Coupler: The Analytical Versus Phase-Space Method**
Mohd-Syafiq M. Hanapi, Abdel-Baset M. A. Ibrahim, Rafael Julius, and *H. Eleuch*
Accepted in: *Canadian Journal of Physics* (2021).
- 13. Entanglement dynamics induced by a squeezed coherent cavity coupled nonlinearly with a qubit and filled with a Kerr-like medium**
A.-B. A. Mohamed, and *H. Eleuch*
Entropy **23**, 496 (2021).
- 14. Analysis of the Quantum Algorithm based on Entanglement Measure for Classifying Boolean Multivariate Function into Novel Hidden Classes: Revisited**
M. Zidan, S. Aldulaimi and *H. Eleuch*
Appl. Math. Inf. Sci. **15**, 643 (2021).
- 15. Atomic population inversion and absorption-dispersion spectra driven by modified double, Saeed Aldulaimi-exponential quotient pulses in three-level atom**
N. Boutabba, S. Grira and *H. Eleuch*
Results in Physics **24**, 104108 (2021).
- 16. Tavis-Cummings model with moving atoms**
Kamal Berrada, Sayed Abdel-Khalek, Eied M. Khalil, *Hichem Eleuch*, Abdel-Shafy F Obada, and Esraa Reda
Entropy **23**, 452 (2021).

17. **Solutions to the Konopelchenko-Dubrovsky equation and the Landau-Ginzburg-Higgs equation via the generalized Kudryashov technique**
Hemonta Kumar Barman, M. Ali Akbar, M.S. Osman, Kottakkaran Sooppy Nisar, M. Zakarya, Abdel-Haleem Abdel-Aty, and H. Eleuch
Results in Physics 24, 104092 (2021).
18. **Dynamics of nonclassical properties of a $Su(3)$ -system interacting with an open two parametric amplifier modes**
A.-B. A. Mohamed, H. A. Hessian, A.-S. F. Obada and H. Eleuch
JOSA B 38, 1556 (2021).
19. **Optical tomography dynamic for time-dependent coherent states generated by an open qubit-cavity system**
A.-B. A. Mohamed, E. M. Khalil, M. M. Selim and H. Eleuch
Results in Physics 22, 103940 (2021).
20. **Two-qubit local Fisher information correlation beyond entanglement in a nonlinear generalized cavity with an intrinsic decoherence**
A.-B. A. Mohamed, E. M. Khalil and H. Eleuch
Entropy 23, 311 (2021).
21. **Accurate novel explicit complex wave solutions of the (2+1)-dimensional Chiral nonlinear Schrödinger equation**
B. Alshahrani, H. A. Yakout, Mostafa M. A. Khater, Abdel-Haleem Abdel-Aty, Emad E. Mahmoud, Dumitru Baleanu, and H. Eleuch
Results in Physics 23, 104019 (2021).
22. **Dephasing Process of a Single Atom Interacting with a Two-Mode Field**
E. M. Khalil, K. Berrada, S. Abdel-Khalek, Beida Alsubei and H. Eleuch
Entropy 23, 252 (2021).
23. **Quantum Fisher information and Bures distance correlations of coupled two charge-qubits inside a coherent cavity with the intrinsic decoherence**
A.-B. A. Mohamed, E. M. Khalil, M. Selim and H. Eleuch
Symmetry 13, 352 (2021).
24. **Analysis of voltage and current flow of electrical transmission lines through mZK equation**
M. A. Akbar, Md. A. Kayum, M. S. Osman, A. H. Abdel-Aty, and H. Eleuch
Results in Physics 20, 103696 (2021).
25. **Long-time protection of correlations and coherence in squeezed thermal bath**
K. Berrada and H. Eleuch
Chaos, Solitons & Fractals 143, 110501 (2021).
26. **Dynamics of trace distance and Bures correlations in an open three-qubit XY chain: Intrinsic noise model**
A-H. Abdel-Aty, A. B. A. Mohamed, and H. Eleuch
Physica E 128, 114529 (2021).
27. **Detecting topological edge states with the dynamics of a qubit**
M. Zaimi, C. Boudreault, N. Baspin, H. Eleuch, R. MacKenzie, and M. Hilke
Physics Letters A 388, 127035 (2021).
28. **Einstein-Podolsky-Rosen steering and nonlocality in quantum dot systems**
K. Berrada, and Hichem Eleuch
Physica E, 126 114412 (2021).
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249. **The Reasoning by Analogy in Negotiation**
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Invited Talks for Conferences, Workshops, and Seminars

- Applications of ERS and Supersymmetry for Generating Analytical Solutions of the Schrödinger equations
December 2020, New York University at Abu Dhabi, UAE
- Analytical solutions of the Schrödinger equation
November 2020, Sharjah University, Department of Applied Physics and Astronomy, UAE
- Exact spectra of harmonic like potentials
January 2020, IQSE, Texas A&M University, College Station, Tx, USA
- Harmonic-like Potentials: New classes of potentials with exact eigenenergies and eigenfunctions.
The Winter Colloquium on the physics of Quantum Electronics 2020.
January 2020, Snow Bird, Utah, USA
- ERS-method, analytical solutions for the Schrödinger equation and applications in random media.
December 2019, American University of Sharjah, Sharjah, UAE.
- Robust squeezing by dipolaritons in double quantum wells microcavity
VII International Conference “Frontiers of Nonlinear Physics”,
June-July 2019, Nizhny Novgorod, Russia
- Black Holes : The Fascinating Journey from Predicting them to Seeing them.
April 2019, Abu Dhabi University, Abu Dhabi, UAE.
- ERS Method, Analytical Solutions of the Schrödinger Equation and
Application for the Wave Propagation in Random Media
February 2019, Department of Physics, University of North Texas, Denton, Texas, USA.
- Non-Hermitian Formalism, width bifurcation and dynamical phase transition in open quantum systems
The Winter Colloquium on the physics of Quantum Electronics 2019.
January 2019, Snow Bird, Utah, USA
- Non-Hermitian Formalism in open quantum systems
TAMU-PQE Follow-on Workshop on Black Hole, Nonequilibrium Physics and Quantum Computing.
January 2019, College Station, Texas
- Quantum Computing Technologies for the Future Mars Missions
One-Day MiniSymposium on Mars
November 2017, United Arab Emirates University, Al Ain, UAE.
- Analytical solutions from two-level system to Anderson localization
TAMU-Princeton-Baylor Summer Symposium on Quantum Science and Engineering
Casper, Wyoming, July 2017.
- Analytical Methods for Schrödinger Equation and Application to Random Media
Princeton-TAMU Symposium on Quantum Physics and Engineering, Princeton University,
Princeton, New Jersey, June 2017.
- Analytical Methods for studying the dynamics of the two-level system
Quantum Africa 4, Tunis, Tunisia, May 2017.
- The ERS Method and its applications: From for Schrödinger Equations to Anderson Localization.
Faculty of Mathematical, Physical and Natural Sciences of Tunis
Tunisia, May 2017.
- Physical Models and applications in Finance.
Colloque International Financement Et Gestion Des Risques Des Projets
Innovants et Clusters Industriels, Hammet, Tunisia, May 2017.
- Analytical Methods for Schrödinger Equation:
From Two-Level System to Anderson Localization.
AMO-CM Seminar.
College Station, Texas, February 2017.

- Hamiltonian for Raman Scattering via Canonical X-Form
Mini Seminar on Raman Scattering: Fundamental and Applications
Baylor University, Waco, Texas, February 2017.
- Magnus expansion method for a two-level system interacting with a few-cycle TAMU-PQE Follow-on Workshop
College Station, Texas, January 2017.
- Population transfer and pulse propagation in atomic media (Plenary speaker)
The Third International Conference on Research to Applications & Markets, Nanosciences session
Hammet, Tunisia, September 2016
- Research at the Institute of Quantum Science and Engineering
Faculty of Mathematical, Physical and Natural Sciences of Tunis
Tunisia, September 2016
- Canonical Transformation of Raman Transitions
TAMU-Princeton-Baylor Summer Symposium, Quantum Biophotonics,
Casper, Wyoming, July 2016.
- Anderson Localization for strong disorder: Analytical results
Institute for quantum Science and Engineering, Physics department, Texas A&M University
March 2016
- Entanglement, quantum state transfer and quantum memory in nanoresonators
The 5th International Conference on Mathematics and Information Sciences, Zewail City of Science and Technology, Egypt, February 2016.
- Entanglement, nonlinearity and quantum state transfer in nanoresonators
Department of Physics
Concordia University, March 2015.
- Analytical solution to the Schrödinger equation and the ERS method
Montreal Joint High Energy Physics Seminars
Université de Montréal, May 2013.
- Analytical solution to the Schrödinger equation and the ERS (Eleuch-Rostovtsev-Scully) method
Department of Physics
McGill University, November 2012.
- ERS-method and analytical solutions for Schrödinger and Dirac equations.
Department of Mathematics and Statistics.
Concordia University, June 2012.
- Alpha-Model and predictions.
Max Planck Institute for the Physics of Complex Systems, Dresden.
February 2012
- Strong fields and photon statistics
Technical University of Dresden, November 2011.
- Analytical Solution to Position Dependent Mass for 3D-Schrödinger Equation
The 2nd International Conference Mathematics & Information science
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- Analytical solution to the Schrödinger equation.
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- Some analytical solutions to fundamental equations in physics
in King Abdulaziz City for Science and Technology.
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- Analytical Solution for 3D Stationary Schrödinger Equation: Implementation of Huygens's Principle for Matter Waves.
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Casper, Wyoming, July 2010.

- Analytical Solutions of the Schrödinger Equation
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College Station, Texas, January 2010.
- Analytical Solutions to the Schrödinger Equation in Time and Space
Physics of Quantum Electronics Workshop (40), Snowbird
Snowbird, January 2010.
- Excitation of atomic coherence using off –resonant laser pulses
TAMU/Princeton Workshop on Quantum Science and Engineering
Jackson Hole, WY, August 2009.
- Analytic Solution to the Schrödinger’s Equation
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- The Photon sheds light on quantum: The Lamb Shift in single Photon Dicke Super-radiance
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- XUV coherent Super-radiance (Atto-second Nonlinear optics)
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January 2009.
- Excitation of atomic coherence using off –resonant laser physics
Physics of Quantum electronics Workshop, Snowbird
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Patents

1. **Frequency-Tunable Quantum Microwave to Optical Conversion System**
M. Qasymeh and *H. El Euch*
Patent No: US 10,824,048 B2. Date of Patent: Nov. 3, 2020. (Supported by TAKAMUL for patent filling, Abu Dhabi Department of Economic Development, 50 000 AED).
2. **Wideband Graphene-Based Electro-Optic Entangler**
M. Qasymeh and *H. El Euch*
Patent No: US 11,048,107 B2. Date of Patent: June. 29, 2021.
3. **Novel Quantum Random Access Memory**
H. Eleuch, M. Zidan, M. Abdel-Aty, and A. H. Abdel-Aty, A. Khalil
Patent No: US 11,093,850 B1. Date of Publication: August 17, 2021.
4. **Graphene Multi-Layered Structure for ultra-sensitive microphotonic devices with microvolts inputs**
M. Qasymeh and *H. El Euch*
US2020/0319525 A1 (Applied to US Patent Office)
5. **Optically Activated Graphene-Based Microwave Field Squeezer**
M. Qasymeh and *H. El Euch*
Applied to US Patent Office.
6. **Coherent Microwave transmission without refrigeration at room temperature**
M. Qasymeh and *H. El Euch*
Applied to US Patent Office.
7. **Quantum Teleportation Using Microwave Enabled Plasmonic Graphene Waveguide**
M. Qasymeh, M. Asjad and *H. El Euch*
Applied to US Patent Office.