

Hichem Eleuch

Citizenship: Canadian

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Contact Number: +971 50 3410769

Research Interests: Physics, Applied Physics, Quantum Computing, Matter-Radiation Interactions, Condensed Matter Physics, 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 (**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

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 170 publications in journals with impact factors (see the list of publications below)
- More than 50 invited talks
- Participated in over 70 international conferences
- 5 Patents (applied)
- H-factor: 34 (Web of Science), 37 (Google Scholar)

Eight selected publications

1. "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).
2. "Quantum Microwave-to-Optical Conversion in electrically driven Multilayer Graphene"
M. Qasymeh and H. Eleuch
Optics Express **25**, 5945 (2019)
3. "Probing Anderson localization using the dynamics of a qubit"
H. Eleuch, M. Hilke, and R. MacKenzie
Phys. Rev. A **95**, 062114 (2017).
4. "High-efficiency quantum state transfer and quantum memory using a mechanical oscillator"
E. A. Sete and H. Eleuch,
Phys. Rev. A **91**, 032309 (2015)
5. "Localization and delocalization for strong disorder in one-dimensional continuous potentials"
H. Eleuch and M. Hilke
New J. Phys. **17**, 083061 (2015).
6. "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).
7. "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).
8. "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 (Accepted, US2020/0319526 A1), M. Qasymeh and H. Eleuch
2. Graphene multi-layered for ultra-sensitive microphotonic devices with microvolts inputs (US2020/0319525 A1), M. Qasymeh and H. Eleuch
(Applied Patent to United States Patent and Trademark Office).
3. Wideband Graphene-Based Electro-Optic Entangler, M. Qasymeh and H. Eleuch
(Applied Patent to United States Patent and Trademark Office).
4. Optically Activated Graphene-Based Microwave Field Squeezer, M. Qasymeh and H. Eleuch
(Applied Patent to United States Patent and Trademark Office).
5. Novel Quantum Random Access Memory, H. Eleuch, M. Zidan, M. Abdel-Aty, A. H. Abdel-Aty, A. Khalil
(Applied Patent to 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.
- 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 6 Years

- 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).
- 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 INTRIQU(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 INTRIQU (Canada): 9 000 CA\$ (Co-PI).

Collaborators, Last 5 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

Post docs

- Muzzamal Iqbal Shaukat (July 2020-present)
- Mohammed Zidan (June 2020-Present)
- Ali Homid (September-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

- Anaelle 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

2019 - 2020	Member in National Committee for EmSAT Achieve Physics, Ministry of Education, UAE
2016 - 2017	Member in Program Committee for Quantum Africa 4
2006 - 2013	Regular Associate Member at 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 Instrumentation and Measures 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) Instrumentation and Measures INSAT, University of Carthage TD (=Recitation/Tutorial) Quantum Mechanics, DEA (=Master) Instrumentation and Measures INSAT, University of Carthage
2001 - 2004	TD Quantum Mechanics, Master of Instrumentation and Measures 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 Instrumentation and Measures engineering
INSAT, University of Carthage

Undergraduate Level Courses:

- Feb - Apr 2006 Basic Concepts in Physics
(12 Lectures) University of Auckland, New Zealand
- 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 course in Mechanics
1st Year DEUG, University of Cergy,Pontoise, France
Laboratory course in Electricity
1st Year DEUG, University of Cergy,Pontoise, France

List of Publications

Papers in Physics and Mathematics

- Interaction of a dipolariton system with squeezed light from parametric down-conversion process**
H. Jabri and *H. Eleuch*
Phys. Rev. A **101**, 053819 (2020).
- Correlation Dynamics of Nitrogen Vacancy Centers Located in Crystal Cavities**
A-H Abdel-Aty, H. Kadry, A.-B. A. Mohamed and *H. Eleuch*
Scientific Reports **10**, 16640 (2020).
- Hybrid Two-Mode Squeezing of Microwave and Optical Fields Using Optically Pumped Graphene Layers**
M. Qasymeh and *H. Eleuch*
Scientific Reports **10**, 16676 (2020).
- Quasi-probability information in a coupled two-qubit system interacting non-linearly with a coherent cavity under intrinsic decoherence**
A. B. A. Mohamed, and *H. Eleuch*
Scientific Reports **10**, 13240 (2020).
- Quantum correlations of two-qubit beyond entanglement in two lossy cavities linked by a waveguide**
A. B. A. Mohamed, H. A. Hessian and *H. Eleuch*
Chaos, Solitons & Fractals **135**, 109773 (2020).
- Entanglement of Microwave and Optical Fields using Electrical Capacitor Loaded with Plasmonic Graphene Waveguide**
M. Qasymeh and *H. Eleuch*
IEEE Photonics **12**, 7500212 (2020).
- Robustness of Generated Geometric Phase of Quantum Wells in Two Open Waveguide-Coupled Optical Cavities**
A.-B. A. Mohamed, A. Farouk, A.-H. Abdel-Aty, and *H. Eleuch*
IEEE Access **8**, 158745 (2020).
- Quantum effects in two-qubit systems interacting with two-mode fields: Dissipation and dipole-dipole interplay effects**
Mostafa Khater, Abdel-Baset A. Mohamed, *Hichem Eleuch*, Abdel-shafi Obada
Results in Physics **17**, 103019 (2020).
- Quantum control of an optically dense atomic medium: pulse shaping in a V-type three-level system**
N. Boutabba and *Hichem Eleuch*
Accepted in *Results in Physics* (2020).
- Nonclassical effects for a qubit coupled to a coherent two-mode cavity with intrinsic decoherence**
Abdel-Baset A. Mohamed, E. M. Khalil, A.-S. F. Obada, *Hichem Eleuch*, Abdel-shafi Obada
Accepted in: *Results in Physics* (2020)
- Non-Classical Computing Problems: Toward Novel Type of Quantum Computing Problems**
M. Zidan, M. Abdel-Aty, *Hichem Eleuch*, Abdel-shafi Obada
Accepted in: *Results in Physics* (2020)
- On the New Explicit Solutions of the Fractional Nonlinear Spacetime Nuclear Model**
Abdel-Haleem Abdel-Aty, Mostafa M.A. Khater, Raghda A.M. Attia, M. Abdel-Aty, and *H. Eleuch*
Fractals **28**, 2040035 (2020).
- New approach to approximate the solution of fractional order Volterra integro-differential equations**
Muhammad Akbar, Rashid Nawaz, Sumbal Ahsan, K.S.Nisar, Abdel-Haleem Abdel-Aty, and *H. Eleuch*
Accepted in: *Results in Physics* (2020).
- Quasi-Probability Husimi-Distribution Information and Squeezing in a Qubit-System Interacting with a Two-Mode Parametric Amplifier cavity**
E. M. Khalil, Abdel-Baset Mohamed, A.-S. F. Obada, and *H. Eleuch*
Accepted in: *Mathematics* (2020).
- Magnus expansion applied to a dissipative driven two-level system**
T. Begzjav, *H. Eleuch*
Results in Physics **17**, 103098 (2020).
- Novel computational nano-solitons wave solutions of the ionic waves propagating along microtubules in living cells**
Abdel-Haleem Abdel-Aty, Mostafa M.A. Khater, Raghda A. M. Attia, *Hichem Eleuch*
Mathematics **8**, 697 (2020).

17. **Bures and Trace-Distance Correlations of Quantum Wells in Open Microcavities Linked by an Optical Waveguide**
A.-B. A. Mohamed, M. Abdel-Aty, and *H. Eleuch*
Accepted in: *Optik* (2020).
18. **Dynamics of Coupled Two Qubits Interacting with Two-Photon Transitions via Nondegenerate Parametric Amplifier: Non-local Correlations under decoherence**
A.-B. A. Mohamed, A. Farouk, M. F. Yassen, and *H. Eleuch*
Accepted in: *JOSA B* (2020).
19. **Nonlinear dynamics in a dipolariton cavity with a squeezed vacuum**
H. Jabri, and *H. Eleuch*
J. Opt. Soc. Am. B **33**, A9 (2020).
20. **Generation of quantum coherence in two-qubit cavity system: Qubit-dipole coupling and decoherence effects**
A. B. Mohamed, H. Hessian, and *H. Eleuch*
Physica Scripta **95**, 075104 (2020).
21. **Nonclassical Effects Based on Husimi Distributions in Two Open Cavities Linked by an Optical Waveguide**
A. B. Mohamed, and *H. Eleuch*
Entropy **22**, 767 (2020).
22. **Exactly Solvable New Classes of potentials with Finite Discrete Energies**
J. Benbourenane and *Hichem Eleuch*
Results in Physics **17**, 103034 (2020).
23. **Analytical and semi-analytical ample solutions of the higher-order nonlinear Schrödinger equation with the non-Kerr nonlinear term**
Mostafa Khater, Raghda Attia, Abdel-Haleem Abdel-Aty, M. Abdou, *Hichem Eleuch*, Dianchen Lu
Results in Physics **16**, 103000(2020).
24. **Quantum correlation via skew information and Bell function beyond entanglement in a two-qubit Heisenberg XYZ model: Effect of the phase damping**
A.-B. A. Mohamed, Ahmed Farouk, M. F. Yassen, *Hichem Eleuch*
Applied Sciences **10**, 3782 (2020).
25. **Quantum correlations and coherence in a driven two-qubit system under non-Markovian dissipative effect**
K. Berrada, B. Raffah, *Hichem Eleuch*
Results in Physics **17**, 103083 (2020).
26. **Einstein-Podolsky-Rosen steering and nonlocality in quantum dot systems**
K. Berrada, and *Hichem Eleuch*
Accepted in: *Physica E*, (2020).
27. **Quantum Dilation and Erosion**
Shi-Yuan Ma, Ashraf Khalil, Hassan Hajjidiab, *Hichem Eleuch*
Applied Sciences **10**, 4040 (2020).
28. **Entanglement control of two-level atoms in dissipative cavities**
Reyad Salah, Ahmed M. Farouk , Ahmed Farouk, M. Abdel-Aty, *Hichem Eleuch*, A.-S. F. Obada
Applied Sciences **10**, 1510 (2020).
29. **Single- and Compound-Mode Squeezing in Nonlinear Coupler with Frequency Mismatch**
Rafael Julius, Mansoor Zahirzai, Abdel-Baset M. A. Ibrahim, *Hichem Eleuch* and Pankaj K. Choudhury
Journal of Electromagnetic Waves and Applications **3**, 301 (2020).
30. **Gain in Single and paired parametric oscillators**
R. Nessler, *H. Eleuch*, W. P. Schleich, and M. O. Scully
J. Mod. Opt. **67**, 1 (2020).
31. **Single- and Compound-Mode Squeezing in Nonlinear Coupler with Frequency Mismatch**
Rafael Julius, Mansoor Zahirzai, Abdel-Baset M. A. Ibrahim, *Hichem Eleuch* and Pankaj K. Choudhury
Journal of Electromagnetic Waves and Applications **34**, 301 (2020).
32. **Quantum dynamics of a qutrit in a cavity filled with Kerr-like medium and intrinsic noise**
A.-B. A. Mohamed, M. M. Elkhateeb, M. Hashem, A.-S. F. Obada, *H. Eleuch*
Modern Physics Letters A, 2050287 (2020).
33. **Graphene-based layered structure for quantum microwave signal up-conversion to the optical domain**
M. Qasymeh and *H. Eleuch*
Optical and Quantum Electronics **52**, 80 (2020).
34. **Dielectric Surface Coated with Thin Partially-Reflecting Mirror – A Revisit to Fresnel Laws**
Author links open overlay panelAbdel-Baset M.A.I brahim, *H. Eleuch*, P. K. Choudhuryd, M. Kamil Abd-Rahman
Optik **207**, 164423 (2020).

35. **Dynamics of a dissipative two-qubit system interacting non-linearly with a generalized field: Entanglement and mixedness**
A.-B. A. Mohamed, H. A. Hessian, and *Hichem Eleuch*
Optik **202**, 163500 (2020).
36. **Quantum plasmonic control of trions in a picocavity with monolayer WS₂**
Zhe He, Zehua Han, Jiangtan Yuan, Alexander M. Sinyukov, *Hichem Eleuch*, Chao Niu, Zhenrong Zhang, Jun Lou, Jonathan Hu, Dmitri V. Voronine, and Marlan O. Scully
Science Advances **5**, EAAU8763 (2019).
37. **Non-locality Correlation in Two Driven Qubits Inside an Open Coherent cavity: Trace Norm Distance and the Maximum Bell Function**
A-B Mohammad, *H. Eleuch*, and C. H. R. Ooi
Scientific Reports **9**, 19632 (2019).
38. **Quantum Microwave-to-Optical Conversion in electrically driven Multilayer Graphene**
M. Qasymeh and *H. Eleuch*
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181. **Nonlinear dissipations and the quantum noise of light in semiconductor microcavities**
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Papers in Complex Systems: Econophysics, Computer Science and Electric Engineering

189. **The effect of market sentiment and information asymmetry on option pricing**
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190. **Impact of Corruption on Economic Development: Case of Tunisia**
A. Zouaoui, A. Al Qudah, C. El Aoun, M. Ben Arab and *H. Eleuch*
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191. **Alpha Model: A Mathematical Modeling Approach Applied to an Air Quality Monitoring Network**
C. El Aoun, N. Boutabba and *H. Eleuch*
[Applied Mathematics & Information Science](#) 9, 27 (2015).
192. **Correlation function and business cycle turning points: a comparison with Markov switching Approach.**
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193. **Rt-Dbp: a multi-criteria priority assignment scheme for real-time tasks scheduling**
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194. **Reasoning by Analogy Using Coulomb's Law (RAUCL) Model in Multi-Criteria Negotiation**
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195. **Study of key pre-distribution schemes in wireless sensor networks: case of BROS (use of WSN)**
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196. **The ICT's Acceptance: Analytical Framework and Empirical Example**
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198. **New Approach of Case-Based Reasoning**
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200. **Long Run Performance Following Seasoned Equity Offering on Tunisian Stock Market: Cumulative Prospect Preference Approach.**
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203. **Options Assessments and Risk Management in Presence of the imperfections**
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Conference Papers

207. **Graphene-Based Electro-Optic Entangler**
M. Qasmehy , *H. Eleuch*
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May 2020, San Jose, California, USA.
208. **Qubits, decoherence and edge state detection: illustration using the SSH model**
M. Zaimi, C. Boudreault, N. Baspin, H. Eleuch, R. MacKenzie, M. Hilke
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209. **Quantum States in Nonlinear Coupler with Frequency Mismatch**
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210. **Solitary waves propagation in Three-Level Atomic Media**
S. Grira, *H. Eleuch*,
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211. **The q-Derivative and Differential Equation**
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212. **Robust squeezing by dipolaritons in double quantum wells microcavity**
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Conference paper in
VII International Conference “Frontiers of Nonlinear Physics”,
June-July 2019, Nizhny Novgorod, Russia
213. **Graphene Multilayers for Quantum Microwave Signal Up-Conversion to the Optical Domain**
Montasir Qasymeh, *Hichem Eleuch*

Conference paper accepted in
Connecting Theory and Application of Optoelectronic Devices (NUSOD), 19th International conference,
July 2019, Ottawa, Canada

214. **Probing Anderson Localization Using the Dynamics of a Qubit**
Hichem Eleuch, Michael Hilke and Richard MacKenzie
Springer Proceedings in Mathematics and Statistics
263: Quantum Theory and Symmetries with Lie Theory and Its Applications in Physics, Volume 1, p321-329 (2018)
QTS-X/LT-XII, Varna, Bulgaria, June 2017
215. **Experimental demonstration of Rabi Oscillations produced by adiabatic pulse due to initial atomic coherence**
Z. Yi, X. Zhao, Z. Wang, T. Peng, A. A. Svidzinsky, *H. Eleuch*, and M. O. Scully
Conference on Lasers and Electro-Optics, (Optical Society of America, 2018), paper FM4H.4.
216. **Statistical Properties of a Raman Three-level Atom Interacting with a Cavity Field**
AHM Ahmed, LY Cheong, N. Zakaria, N. Metwally and *H. Eleuch*.
INTERNATIONAL CONFERENCE ON FUNDAMENTAL AND APPLIED SCIENCES 2012 (ICFAS2012)
Book Series: AIP Conference Proceedings, Volume: 1482 Pages: 373-375 (2012).
217. **Transient lasing without inversion in He-like Boron**
E. A. Sete, A. A. Svidzinsky, Y. V. Rostovtsev, *H. Eleuch*, P. K. Jha, S. Suckewer, and M. O. Scully
American Physical Society, Joint Fall 2011 Meeting of the Texas Sections of the APS
218. **Le Raisonnement á Base de Cas Appliqué á la Négociation Electronique**
Chokri El Aoun, Hella Ben Ayed, *Hichem Eleuch*, Esma Aimeur and Farouk Kamoun
5th International Conference for Sciences of Electronics, Technology of Information and Telecommunications (SETIT-IEEE)
Hammamet, Tunisia, March 22-26, 2009.
219. **Generation of Maximal Coherence in a Two-Level System via Breaking Adiabaticity**
Yuri Rostovstev, *Hichem Eleuch*, Anatoly Svidinsky and Marlan O; Scully.
Frontiers in Optics, Rochester, October 2008.
220. **The Reasoning by Analogy in Negotiation**
Chokri El Aoun, *Hichem Eleuch*, Hella Ben Ayed, Esma Aimeur and Farouk Kamoun
(SETIT-IEEE) Hammamet, Tunisia, March 25-29, 2007.
221. **An Electric Physics-Based Strategy For Multicriterion Negotiation**
Chokri El Aoun, Hella Ben Ayed, *Hichem Eleuch*, Esma Aimeur and Farouk Kamoun
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222. **Modèle Electrique Non Linéaire Des Cellules Solaires**
M.Abdelkarim, *Hichem Eleuch* et M.Fathallah
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223. **An Electric Physics-Based Approach for Stock Exchange Prediction**
Chokri El Aoun, Hella Ben Ayed, Esma Aimeur, Farouk Kamoun and *Hichem Eleuch*
Sixth International on Electronic Commerce Research, Dallas, USA,. October 23 - 26, 2003.
224. **Zero inflation and interest credit and opportunity (Zico) with stochastic returns and continuous time modelling**
Fathi Abid and *Hichem Eleuch*
Global Business & Economics Review - Anthology 2002, 371 (2002)

Invited Talks for Conferences, Workshops, and Seminars

- Exact spectra of harmonic like potentials
January 2020, IQSE, Texas AM 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
Sohag, Egypt, September 2011.
- Geometric Phase in Semiconductor Microcavities
The 2nd International Conference Mathematics & Information science
Sohag, Egypt, September 2011.
- Analytical Solution to the 3+1 Dirac Equation
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Sohag, Egypt, September 2011.
- Analytical solution to the Schrödinger equation.
Max Planck Institute for the Physics of Complex Systems, Dresden.
August 2011.
- Alpha-model for prevision
July 2012, Max Planck Institute for the Physics of Complex Systems, Dresden.
- Attosecond Physics: An atom interacting with ultra-short pulse
King Fahd University of Petroleum & Minerals
February 2011.
- Some analytical solutions to fundamental equations in physics
in King Abdulaziz City for Science and Technology.
Riyadh, January 2011.
- Analytical Solution for 3D Stationary Schrödinger Equation: Implementation of Huygens’s Principle for Matter Waves.
Summer School on Quantum Science and Engineering
Casper, Wyoming, July 2010.
- Analytical Solutions of the Schrödinger Equation
TAMU Physics of Quantum Electronics Workshop
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
TAMU Physics of Quantum electronics Workshop, Texas
Texas, January 2009.
- The Photon sheds light on quantum: The Lamb Shift in single Photon Dicke Super-radiance
SPIE conference San Jose, California [On behalf of Prof. M. O. Scully
January 2009.
- XUV coherent Super-radiance (Atto-second Nonlinear optics)
SPIE conference San Jose, California [On behalf of Prof. M. O. Scully
January 2009.
- Excitation of atomic coherence using off –resonant laser physics
Physics of Quantum electronics Workshop, Snowbird
January 2009.

Patents

1. **Frequency-Tunable Quantum Microwave to Optical Conversion System**
M. Qasymeh and *H. Eleuch*
(Supported by TAKAMUL for patent filling, Abu Dhabi Department of Economic Development, 50 000 AED).
Accepted, US2020/0319526 A1.
2. **Graphene Multi-Layered Structure for ultra-sensitive microphotonic devices with microvolts inputs**
M. Qasymeh and *H. Eleuch*
US2020/0319525 A1 (Applied to US Patent Office)

3. **Wideband Graphene-Based Electro-Optic Entangler**
M. Qasymeh and *H. Eleuch*
Applied to US Patent Office.
4. **Optically Activated Graphene-Based Microwave Field Squeezer**
M. Qasymeh and *H. Eleuch*
Applied to US Patent Office.
5. **Novel Quantum Random Access Memory**
H. Eleuch, M. Zidan, M. Abdel-Aty, and A. H. Abdel-Aty, A. Khalil
Applied to US Patent Office.