

Daoud Mohammed

Professeur de l'Enseignement Supérieur



Laboratoire de la Physique des hautes énergies.
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CURRICULUM VITAE

Daoud Mohammed

50 years, married, 1 daughter
Professor at University Hassan II, Casablanca
Department of Physics
Faculty of Sciences-Ain Chock
Casablanca, Morocco.
email: m_daoud@hotmail.com
Phone number: 06 68 06 43 93.

Degrees

1988 *Licence és Sciences Physiques*, University Mohammed V, Rabat, Morocco.

1989: *Diplôme d'études approfondies* (DEA) in Theoretical Physics from University Claude Bernard Lyon 1, France.

1992: *Diplôme de Doctorat d'université* in Theoretical Physics from University Claude Bernard Lyon 1, France.
Processus d'absorption multiphotonique pour des ions de transition et méthodes d'adaptation à la symétrie.

1997: *Diplôme de Doctorat d'état* in Mathematical Physics from University Mohammed V, Rabat, Morocco.
Rôle des symétries dans les processus multiphotoniques et les statistiques quantiques intermédiaires.

Academic positions

1993-1995: *Attaché temporaire à l'enseignement et la recherche* (ATER), University Claude Bernard Lyon 1, France.

1995-1997: *Maître assistant*, University Ibnou Zohr, Agadir, Morocco.

1997-2001: *Maître de Conférences*, University Ibnou Zohr, Agadir, Morocco.

2001-2006: *Professeur de L'enseignement Supérieur-Grade A*, University Ibnou Zohr, Agadir, Morocco.

2006-2012: *Professeur de L'enseignement Supérieur-Grade B*, University Ibnou Zohr, Agadir, Morocco.

2012-Now: *Professeur de L'enseignement Supérieur-Grade C*, University Ibnou Zohr, Agadir, Morocco.

Main Research Areas

Quantum Information Theory.

Quantum entanglement, Quantum discord, Decoherence of quantum systems, Quantum cryptography, Quantum teleportation, Quantum computing, Quantum codes.

Quantum Mechanics and Quantum Optics.

Exactly solvable quantum models, Quantum coherence and decoherence theory, Light-Matter interaction, Multi-photon absorption processes of atoms and ions.

Symmetry Methods in Quantum Physics

Finite and compact groups and representation theory applied to nuclear, atomic and molecular spectroscopy. Lie and super-Lie algebras and symmetries in quantum physics.

Quantum Coherence Theory in Quantum Physics

Coherent states and Intelligent states for exactly solvable models. States minimizing the Robertson-Schrödinger relation. Analytical and algebraic realizations of coherent states. Quantum-classical transition

Geometric Methods in Quantum Physics

Non commutative geometry in condensed matter physics. Quantum Hall effect in higher dimensions. Anyons, parastatistics and fractional spins emerging from the topological effects in quantum systems.

Mathematical Physics

Symmetries in Physics. Groups and representations theory. Lie algebras and quantized Lie algebras for quantum physics. Z_2 -graded algebras. Symplectic, Riemannian and Kählerian manifolds in quantum physics and quantum field theory.

Supersymmetric Methods in Quantum Physics

Supersymmetric quantum mechanics. Supersymmetric quantum states. Fractional supersymmetric systems and generalized spin systems.

Other Research Interests

Supersymmetry in particle physics.

Quantum gravity.

Topological effects in physics.

Cosmology.

String theory.

Quantum phase transitions and topological orders.

Teaching and tutoring activities

Teaching

Undergraduate (DEUG): Classical and Quantum mechanics, Electromagnetism, Thermodynamics.

Graduate of maitrise: Quantum mechanics, Nuclear physics, Atomic Physics, Quantum optics.

Graduate of Master: Group theory, Relativistic quantum mechanics, Quantum field theory, Introduction to Supersymmetry, Gauge theories. Mathematical methods for physics.

Supervising Phd Thesis

Supervisor of the Phd thesis of J. Douari concerning "Anyons, statistiques fractionnaire et groupes quantiques." (2001).

Supervisor of the Phd thesis of A. H. El Kinani concerning "Etats cohérents et intelligents généralisés pour des systèmes quantiques exactement solubles" (2005).

Supervisor of the Phd thesis of A. Hamama concerning "Théories des champs non commutatives et effet Hall quantique fractionnaire" (2008).

Supervisor of the Phd thesis of R. Essaber
"Mesures quantiques de l'intrication en théorie quantique de l'information: Aspects algébriques et géométriques"
(April 2016)

Supervisor of the Phd thesis of W. El Kaydi
"Intrication dans les systèmes d'états cohérents"
(March 2016)

Supervisor of the Phd thesis of S. Seddik
"Codes correcteurs d'erreurs en théorie quantique de l'information"
(May 2016)

Supervisor of the Phd thesis of Hanane El Hadfi
"Contrôle des processus de décohérence et métrologie quantique avec des états cohérents"
(expected date: September 2016)

Supervising Phd Thesis: in progress

Supervisor of the Phd thesis of J. El Qars
"Caractérisation et quantification des corrélations quantiques dans des systèmes optomécaniques"

Supervisor of the Phd thesis of B. Benzimoune
"Etude géométrique des corrélations quantiques dans des systèmes multipartites"

Supervising DESA and Master thesis

Supervisor of Diploma thesis (DESA) of N. Hassani
"Etats cohérents et intelligents for des algèbres de Lie " (2005).

Supervisor of Diploma thesis (DESA) of F. Oufedjikh
"Mécanique quantique supersymétrique en dimensions supérieures" (2005).

Supervisor of Diploma thesis (DESA) of J. Maher
"Géométrie des états cohérents et produit de Moyal" (2005).

Supervisor of the Master thesis of R. Essaber
"Corrélations quantiques en théorie quantique de l'information" (Rabat 2012)

Supervisor of the Master thesis of M. El Banany
"Méthodes géométriques pour l'étude des corrélations quantiques" (Rabat 2012)

Supervisor of the Master thesis of T. Charki
"Transitions de phase quantique et ordres topologiques" (Rabat 2012)

Supervisor of the Master thesis of W. El Kaydi
"Champs quantiques sur des espaces non commutatifs" (Rabat 2012)

Supervisor of the Master thesis of H. El Oulji
"Géométrie non commutative et applications en la physique du graphène" (Rabat 2012)

Supervisor of the Master thesis of Aouini Saloua
"Intrication quantique des états cohérents et la géométrie symplectique" (Rabat 2013)

Supervisor of the Master thesis of Nadia Hadar
"L'intrication Quantique et Mesure Géométrique de la Discorde Quantique" (Rabat 2013)

Supervisor of the Master thesis of Ahami Nizar
"Intrication Quantique à basse dimension" (Rabat 2013)

Supervisor of the Master thesis of Martin Mihigo Byamungu "Communication et cryptographie quantiques avec des variables continues" (Rabat 2014)

Supervisor of the Master thesis of Bilal Benzimoune
"Décohérence quantique en théorie quantique de l'information" (Rabat 2014)

Supervisor of the Master thesis of Yassine Bouzidi
"Etude de la distribution des clefs quantiques avec plusieurs attaques" (Rabat 2015)

Supervisor of the Master thesis of Youssef Ait Taleb
"Métrologie quantique avec des états cohérents" (Rabat 2015)

Supervisor of the Master thesis of Omar Achkir
"Aspects géométriques des codes correcteurs d'erreurs" (Rabat 2015)

Supervisor of the Master thesis of Abdessamad El Baghdadi
"Discorde Gaussienne dans des cavités optomécaniques" (Rabat 2014)

Editor-Referee

Member of editors advisory panel of Journal of Physics A: Mathematical and Theoretical.

Member of editorial board of Journal of African Journal of Mathematical Physics.

Referee for Journal of Physics A: Mathematical and Theoretical.

Referee for Journal of Physics B: Atomic, Molecular and Optical Physics.

Referee for Journal of Mathematical Physics.

Referee for Physica A.

Referee for Physics Letters A.

Referee for European Journal of Physics C.

Reviewer for Mathematical Reviews.

Reviewer for Fortschritte der Physik - Progress of Physics.

Positions

Regular associate member of International centre for Theoretical Physics (ICTP), Trieste, Italy (2010-2016).

Invited Professor at Max Planck Institute for the Physics of Complex Systems (several times).

Invited Professor at University Claude Bernard Lyon 1, France (several times).

Associate researcher at Centre de recherches mathématiques, Montréal, Canada(2000).

Memberships

Coordinator of GNDR-IQ (Groupement National De Recherches-Information Quantique).

Vice president of Moroccan Society of Mathematical Physics.

Member of national steering committee of RHEMAP: Réseau National de Physique des Hautes Energies et Physique Mathématique.

Member of the International Association of Mathematical Physics.

Member of the editorial board of African Journal of Mathematical Physics.

Member of RENAPT: Réseau National de Physique Théorique,(1999-2004).

Member of GNPHE: Groupement national de Physique des Hautes Energies.

Expertise

Expert for CNRST (Centre National de la Recherche Scientifique et Technique)-Morocco.

Expert for CONICYT, la Comisión Nacional de Investigación Científica y Tecnológica (Chile)

Expert for National Research Council (CNCS)- Roumania

Organisation of National and International Meetings

Ecole Nationale de Physique quantique, (Rabat les 27-28-29 Octobre 1999):
Etats cohérents: Aspects géométriques et algébriques.

Premier Workshop de Physique Théorique Organisé par le réseau national de physique théorique (RNPT);
Faculté des sciences, Rabat, Maroc, 16-17/06/2000
"la géométrie non commutative la théorie des supercordes la physique des particules"

Ecole Nationale "Symétries en physique", (Rabat les 01-03 Décembre 2002).

Rencontre Nationale de RENAPT (Tanger, 24-26 May 2004).
Etats Cohérents et Applications, Phénoménologie du MSSN et QCD, Géométrie Non-Commutative.
Tanger 27 - 29 Mai 2004.

The International Conference on High Energy and Mathematical Physics (Marrakech, 04-07 April 2005).

International colloquium in Mathematical Physics: Non commutative geometry, Symmetries and String theory (Errachidia, 01-03 June 2006).

Rencontre National des Jeunes Chercheurs de Physique (Casablanca, 19-20 December 2006).

12th Workshop on High Energy and Mathematical Physics (Rabat, 17-18 April 2007).

13th Workshop on High Energy and Mathematical Physics (Rabat, 29-31 May 2008).

International Conference: Quantum information theory and related topics (first edition organized by Groupement National de Recherches-Information Quantique)(Agadir, 03-06 October 2010).

International Conference: Quantum information theory and related topics (second edition organized by Groupement National de Recherches-Information Quantique) (Rabat, 13-16 November 2011).

Ecole Nationale: Théorie Quantique de L'Information: Fondements et Applications (Rabat, 30 November and 01 December 2012).

Ecole Nationale: Théorie Quantique de L'Information: Fondements et Applications (Rabat, 31 January and 01 February 2014).

Rencontre National des Jeunes Chercheurs en Physique théorique (Rabat, June 2015).

Research visits (one month and more)

Lyon, Institut de physique nucléaire, December 1996.

Lyon, Institut de physique nucléaire, May-July 1997.

Lyon, Institut de physique nucléaire, December-April 1998.

Trieste, International centre for theoretical physics, August-September 1998.

Lyon, Institut de physique nucléaire, May-July 1999.

Montréal, Centre de recherches mathématiques, Mars-July 2000.

Trieste, International centre for theoretical physics, August 2000.

Trieste, International centre for theoretical physics, August 2001.

Trieste, International centre for theoretical physics, August 2002.

Lyon, Université Claude Bernard, May 2003.

Dresden, Max Planck institute (MPI-PKS), November-December 2003.

Trieste, International centre for theoretical physics, September 2004.

Dresden, Max Planck institute (MPI-PKS), October-November 2005.

Lyon, Institut de physique nucléaire, July 2006.

Trieste, International centre for theoretical physics, September 2006.

Dresden, Max Planck institute (MPI-PKS), December 2006.

Trieste, International centre for theoretical physics, November 2007.

Dresden, Max Planck institute (MPI-PKS), December 2007.

Dresden, Max Planck institute (MPI-PKS), December 2008.

Lyon, Institut de physique nucléaire, July 2009.

Dresden, Max Planck institute (MPI-PKS), November-December 2009.

Lyon, Institut de physique nucléaire, July 2010.

Dresden, Max Planck institute (MPI-PKS), November-December 2010.

Lyon, Institut de physique nucléaire, July 2011.

Dresden, Max Planck institute (MPI-PKS), November-December 2013.

Trieste, International centre for theoretical physics, July-September 2014.

Trieste, International centre for theoretical physics, July-September 2015.

Chapter books

1. M. Daoud and M. Kibler

k-fermionic coherent states

Chapter book in Concise Encyclopedia of Supersymmetry And Noncommutative Structures in Mathematics and Physics,

Duplij S., Siegel W., Bagger J. (Eds.) (2004) 211.

2. M. Kibler and **M. Daoud**

On supersymmetric quantum mechanics

Chapter book in Fundamental World of Quantum Chemistry, A Tribute to the Memory of Per-Olov Lowdin, Volume 3, E. Brandas and E.S. Kryachko (Eds.), Springer-Verlag, Berlin, 2004.

3. M. Daoud and M. Kibler

Phase states and coherent states for generalized Weyl-Heisenberg algebras.

Nankai Series in Pure, Applied Mathematics and Theoretical Physics: Symmetries and Groups in Contemporary Physics, Volume **11** (2013) 289.

4. M. Daoud

Les corrélations quantiques en théorie quantique de l'information.

Actes de la session plénière solennelle de l'académie Hassan II des sciences et techniques, Rabat, 20 - 22 février 2013.

List of Publications

1. J. Sztucki, **M. Daoud** and M. Kibler
Intensity of two photon spectroscopy transitions for $Ni^{2+} : MgO$
Phys. Rev. B. **45** (1992) 2023.
2. **M. Daoud** and M. Kibler
Two-photon spectroscopy of transitions metal ions in cubical symmetry
J. Alloys and Compounds **188** (1992) 255.
3. **M. Daoud** and M. Kibler
Symmetry adaptation and two photon spectroscopy of ions in molecular or solid-state finite symmetry
Symmetry methods in Physics, **1** (1992) 37.
4. **M. Daoud** and M. Kibler
Two photon laser spectroscopy of ions transitions: Interconfigurational transitions
Laser Physics **2** (1992) 704.
5. **M. Daoud** and M. Kibler
Sum rules for multi-photon spectroscopy of ions in finite symmetry
Lett. Math. Phys. **28** (1993) 269.
6. **M. Daoud** and M. Kibler
Symmetry adaptation techniques in n-photon absorption spectroscopy
J. Alloys and Compounds **193** (1993) 219.
7. **M. Daoud** and M. Kibler
Two photon spectroscopy between states of opposite parities
Phys. Rev. B. **52** (1995) 12677.
8. **M. Daoud** and Y. Hassouni
On the generalized statistics through the deformation of the exterior algebra
Mod. Phys. Lett. A. **12** (1997) 457.
9. **M. Daoud**, Y. Hassouni and E.H. Tahri
Deformation of the exterior algebra and the Yang Baxter equation
Inter. J. Theor. Phys. **6** (1997) 1413.
10. **M. Daoud** and M. Kibler
Statistical mechanics of qp-bosons in D-dimensions
Phys. Lett. A **206** (1995) 13.
11. **M. Daoud**, J. Meyer M. Kibler
Statistical mechanics of qp-bosons in D-dimensions
Symmetry and Structural Properties of Condensed Matter, Eds. T.Lulek, B.Lulek and W. Florek (World Scientific).

- 12. M. Daoud** and Y. Hassouni
q-deformed Fock space and statistical properties of quons
Helv. Phys. Acta **71** (1998) 599.
- 13. M. Daoud** and Y. Hassouni
On the generalization of the supersymmetric quantum mechanics
Inter. J. Theo. Phys. **37** (1998) 2021.
- 14. M. Daoud** and Y. Hassouni
A new realization of the fractional supersymmetry
Prog. Theo. Phys. **6** (1997) 1033.
- 15. M. Daoud**, J. Douari and Y. Hassouni
Quonic realization of the deformed H-W algebra
Inter. J. Theo. Phys. **12** (1997) 3071.
- 16. M. Daoud**, Y. Hassouni and M. Kibler
The k-fermions as objects interpolating bosons and fermions
In Symmetries in Science X , eds. B.Gruber and M.Ramek (Plenum Press, New York) 1998.
- 17. M. Daoud**, Y. Hassouni and M. Kibler
On the generalized coherent states
Phys. At. Nuclei **61** (1998) 1821
- 18. M. Daoud** and M. Kibler
Variations on a theme of quons: A non standard basis for Wigner-Racah algebra of the group SU(2)
Recent Res. Devel. Quantum Chem., **2** (2001) 91.
- 19. M. Daoud** and M. Kibler
Variations on a theme of quons: A fractional supersymmetric oscillator
Recent Res. Devel. Quantum Chem., **2** (2001) 101.
- 20. A.Jellal, M. Daoud** and Y. Hassouni
Supersymmetric sine algebra and degeneracy of Landau levels
Phys. Lett. B **474** (2000) 122.
- 21. M. Daoud**, J. Douari and Y. Hassouni
Yang-Baxter equation on two-dimensionnal lattice and some infinite dimensionnal algebras
Acta. Phys. Slovaca **49** (1999) 945.
- 22. M.Mansour, M. Daoud** and Y. Hassouni
fractionnal spin through Q-deformed Lie and super-Lie algebras
Phys. Lett. B **454** (1999) 281.
- 23. M.Mansour, M. Daoud** and Y. Hassouni
fractionnal spin through some quantum algebras
Rep. Math. Phys. **44** (1999) 435.
- 24. M. Daoud** and M. Kibler
A fractional supersymmetric oscillator and its coherent states
In Proceeding of the Sixth Wigner Symposium. math-ph/ 9912024.

- 25. M. Daoud** and M. Kibler
On the fractional supersymmetric quantum mechanics: the fractional supersymmetric oscillator
In Symmetry and Structural Properties of Condensed Matter, Eds. T.Lulek, B.Lulek and W. Florek
(World Scientific). math-ph/ 0101009.
- 26. A.H. El Kinani** and **M. Daoud**
Generalized intelligent states for an arbitrary quantum mechanical system
J.Phys. A: math and general **34** (2001) 5373.
- 27. A.H. El Kinani** and **M. Daoud**
Coherent states à la Klauder-Perelomov for the Pöshl-Teller potentials
Phys. Lett. A **283** (2001) 291.
- 28. A.H. El Kinani** and **M. Daoud**
Generalized intelligent states for nonlinear oscillator
Inter. J. Modern. Phys. B **15**(2001) 2465.
- 29. A.H. El Kinani** and **M. Daoud**
Generalized coherent states and intelligent states for exact solvable quantum systems
J.Math. Phys **43**(2002) 714.
- 30. A.H. El Kinani** and **M. Daoud**
Coherent and generalized intelligent states for infinite square well potential and nonlinear oscillators
Inter. J. Modern. Phys. B **16** (2002) 3915
- 31. M. Daoud** and E.H El Kinani
The Moyal bracket in the coherent states framework
J.Phys. A: math and general **358** (2002) 2639.
- 32. M. Daoud** and V. Hussin
General sets of coherent states and Yanes-Cummings model
J.Phys. A: math and general **35** (2002)7381.
- 33. M. Daoud** and M. Kibler
On two approaches of fractional supersymmetric quantum mechanics
Inter. J. Quantum. Chem **91** (2003) 551.
- 34. M. Daoud** and M. Kibler
fractional supersymmetric quantum mechanics
Phys. Part. Nucl. (Suppl. 1) **33** (2002) 543.
- 35. M. Daoud**
Robertson Schrödinger intelligent states for two-body Calogero model
Mod. Phys. Lett.A **17** (2002) 1805.
- 36. M. Daoud**
Photon-added coherent states for exactly solvable Hamiltonians
Phys. Lett.A **305** (2002) 135.
- 37. M. Daoud** and J. Douari
Extended Weyl-Heisenberg Algebra and Rubakov-Spiridonov Superalgebra Anyonic Realizations

Mod. Phys. Lett. A **18** (2003) 913.

38. M. Daoud and J. Douari

A Generalized Jaynes-Cummings Model Nonlinear Dynamical Superalgebra $u(1/1)$ and Supercoherent States

Inter. J. Mod. Phys. B **17** (2003) 2473.

39. A. Jellal and **M. Daoud**

D-dimensional ideal quantum gases in a $Ar^n + Br^{-n}$ potential

Mod. Phys. Lett. B **17** (2003) 1321.

40. M. Daoud

Extended Voros product in the coherent states framework

Phys. Lett.A **309** (2003) 167.

41. M. Daoud

Covariance of the Grassman star product

Rep. Math. Phys. **52** (2003) 281.

42. M. Daoud and M. Kibler

k-fermionic coherent states

Chapter book in Concise Encyclopedia of Supersymmetry And Noncommutative Structures in Mathematics and Physics,

Duplij S., Siegel W., Bagger J. (Eds.) (2003) 211.

43. M. Kibler and **M. Daoud**

On supersymmetric quantum mechanics

Chapter book in Fundamental World of Quantum Chemistry, A Tribute to the Memory of Per-Olov Lowdin, Volume 3, E. Brandas and E.S. Kryachko (Eds.), Springer-Verlag, Berlin, 2004.

44. M. Daoud and D. Popov

Statistical properties of Klauder-Perelomov coherent states for the Morse potential

Inter. J. Mod. Phys. B **18** (2004) 325

45. M. Daoud and M. Kibler

Fractional supersymmetric quantum mechanics as a set of replicas of ordinary supersymmetric quantum mechanics

Phys. Lett. A **321** (2004) 147.

46. M. Daoud

Generalized intelligent states of the $su(N)$ algebra

Phys. Lett. A **329** (2004) 318.

47. M. Daoud

Analytic representations based on $su(3)$ coherent states and Robertson intelligent states

J. Math. Phys. **45** (2004) 3435.

48. M. Daoud and M.Kibler

Fractional supersymmetric quantum mechanics as superposition of ordinary supersymmetry

Physics of Atomic Nuclei **68** (2005) 1654.

49. M. Daoud

Representations of generalized A_r statistics and eigenstates of Jacobson generators.
Modern. Phys. Lett. A **21** (2006) 1691.

50. M. Daoud

Representations and properties of generalized A_r statistics.
Inter. J. Modern. Phys. A **21** (2006)

51. M. Daoud

Representations and properties of generalized A_r statistics, coherent states and Robertson uncertainty relations .
J. phys. A: mathematical and general **39** (2006) 889.

52. M. Daoud and A. Jellal

Quantum Hall droplets on disc and effective WZW action for edge states
Inter. Jour. of Geometric Methods in Modern Physics **4**(2007) 1187.

53. M. Daoud and M. Kibler

Fractional supersymmetry and hierarchy of shape invariant potentials
Journal of Mathematical Physics **47** (2006) 122108

54. M. Daoud and A. Jellal

Effective WZW action for edge states of quantum Hall systems on Bargman ball
Nuclear Physics **B 764** (2007) 109

55. M. Daoud and A. Jellal

Quantum Hall effect on Flag manifold
Int. J. Mod. Phys. A **23** (2008) 3129.

56. M. Daoud and A. Hamama

Noncommutative scalar fields from symplectic deformation
Journal of Mathematical Physics **49**(2008) 023508.

57. M. Daoud and A. Hamama

Symplectic deformations, Noncommutative scalar fields and Fractional quantum Hall effect
Int. J. Mod. Phys. A **23** (2008) 2591 .

58. M. Daoud and A. Hamama

Chiral bosons on Bargmann space associated with A_r statistics
Journal of Physics A: Mathematical and Theoretical **41** (2008) 205205.

59. M. Daoud and M. Kibler

Phase operators, temporally stable phase states, mutually unbiased bases and exactly solvable quantum systems
J. Phys. A: Math. Theor. **43** (2010) 115303 .

60. M. Daoud, M. El Bouziani, R. Houca and A. Jellal

Magnetism of two coupled harmonic oscillators
Journal of Statistical Mechanics: Theory and Experiment. P01012 (2010)

61. M. Daoud, A. Jellal and A. Oueld Guejdi

Symplectic Fluctuations for Electromagnetic Excitations of Hall Droplets
Journal of Statistical Mechanics: Theory and Experiment (2010) P07017.

- 62. M. Daoud**, A. Jellal and A. Oueld Guejdi
Electromagnetic Excitations of A_r Quantum Hall Droplets
International Journal of Physics A **25**(2010) 3675.
- 63. M. Daoud**, A. Jellal and A. Oueld Guejdi
Electromagnetic Excitations of Hall Systems on Four Dimensional Space.
Inter. Jour. of Geometric Methods in Modern Physics 8 (2011) 1465.
- 64. M. Daoud** and H. Ez-zahraouy
Three dimensional quantum key distribution in the presence of several eavesdroppers
Physica Scripta **84** 045018 (2011).
- 65. M. Daoud** and E. B. Choubabi
Entangled phase states via quantum beam splitter
Optics Communications 284 (2011) 4535.
- 66. M. Daoud** and E. H. El Kinani
Extended Weyl–Heisenberg algebra, phase operator, unitary depolarizers and generalized Bell states
Physics Letters A **375** (2011) 2492.
- 67. M. Daoud**, A. Jellal, E. B. Choubabi and E. H. El Kinani
Bipartite and tripartite entanglement of truncated harmonic oscillator coherent states via beam splitters
J. Phys. A: Math. Theor. **44** (2011) 325301.
- 68. M. Daoud** and M. Kibler
Phase operators, phase states and vector phase states for SU_3 and $SU_{2,1}$
J. Math. Phys. **52** (2011) 082101
- 69. M. Daoud** and H. Ez-zahraouy
Quantum encoding based on optical phase states and mutually unbiased bases in the presence of several eavesdroppers
Journal of Russian Laser Research **33** (2012) 20.
- 70. M. Daoud** and E. B. Choubabi
Bipartite entanglement of multipartite coherent states using quantum network of beam splitters
International Journal of Quantum Information **10** (2012) 1250009.
- 71.** A. Jellal, A. El Mouhafid and **M. Daoud**
Massless Dirac Fermions in Electromagnetic Field
Journal of Statistical Mechanics: Theory and Experiment (2012) P01021.
- 72. M. Daoud** and M. Kibler
Bosonic and k -fermionic coherent states for a class of polynomial Weyl-Heisenberg algebras
J. Phys. A: Math. Theor. **45** (2012) 244036.
- 73. M. Daoud** and M. Kibler
Generalized coherent states for polynomial Weyl-Heisenberg algebras.
AIP Conference Proceedings 1472 (2012) 60 .
- 74. M. Daoud** and R. Ahl Laamara
Quantum discord of Bell cat-states under amplitude damping

J. Phys. A: Math. Theor. **45** (2012) 325302.

75. M. Daoud and R. Ahl Laamara Quantum discord for multipartite coherent states interpolating between Werner and Greenberger-Horne-Zeilinger states
International Journal of Quantum Information **10** (2012) 1250060.

76. M. Daoud and R. Ahl Laamara
Geometric Measure of Pairwise Quantum Discord for Superpositions of Multipartite Generalized Coherent States
Phys. Lett. A **376** (2012) 2361.

77. M. Daoud and M. Kibler
Phase states and coherent states for generalized Weyl-Heisenberg algebras.
Nankai Series in Pure, Applied Mathematics and Theoretical Physics: Symmetries and Groups in Contemporary Physics, Volume **11** (2013) 289.

78. M. Daoud, R. Ahl Laamara and R. Essaber
Quantum correlations dynamics of quasi-Bell states
Int. J. Quantum Inform. **11** (2013) 1350057

79. M. Daoud, R. Ahl Laamara and W. Kaydi
Multipartite quantum correlations in even and odd spin coherent states
J. Phys. A: Math. Theor. **46** (2013) 395302

80. M. Daoud, R. Ahl Laamara, R. Essaber and W. Kaydi
Global quantum correlations in tripartite nonorthogonal states and monogamy properties
Physica Scripta **89** (2014) 065004.

81. M. Daoud, R. Ahl Laamara and W. Kaydi
Unified scheme for correlations using linear relative entropy
Physics Letters A **378** (2014) 3501.

82. M. Daoud, R. Ahl Laamara, and H. El Hadfi
Pairwise quantum and classical correlations in multi-qubits states via linear relative entropy
Int. J. Quantum Inform. **12** (2014) 1450035

83. W. S. Chung and **M. Daoud**
Generalized fermion algebra
Modern Physics Letters A **29** (2014) 1450045.

84. M. Daoud, R. Ahl Laamara and S. Seddik
A recursive approach for geometric quantifiers of quantum correlations in multiqubit Schrödinger cat states
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