

Curriculum Vitæ

Name: **Jamil Mahmoud KHALIFEH**

Nationality: Jordanian



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Ph.D. (Doctorat d'Etat)

in Physics:

Louis Pasteur University, Strasbourg France,
1982.

Thesis Title:

Electronic structure of Impurities in Metals:
Application to Hydrogen in Transition metals.

Key Words:

Electronic Structure- Elastic Energy-Size effect-
Atomic Displacements- Hydrogen in Metals.

Higher Education:

(1977 - 1982)

Louis Pasteur University, (Strasbourg I)
I.P.C.M.S. 4, Rue Blaise-Pascal 67070
- Strasbourg Cedex, France, Candidate for
the degree of Docteur es Sciences
Physiques (Doctorat d'Etat).

(1973 - 1977)

University of Jordan, Amman, Diploma of
Education + M.Sc. in Physics (Title: A
Microscopic Study of Dilute ^3He - ^4He mixtures).

(1968 - 1972)

University of Jordan, Amman, B.Sc. in Physics.

Employment:

(1983 - 1988)

University of Jordan, Department of Physics
Assistant Professor.

(1988-1998)

Associate Professor.

(1998- present)

Professor.

References:

- Dr. C.Demangeat and Dr. Hugues Dreysse,
IPCMS/GEMME
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- Dr M.Gupta,
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- Dr. Abdelkader Abed,
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Honors and Scholarships:

- *Scholarship from Ministry of Foreign Affairs (C.R.O.U.S., France) for the period 1977 - 1982.*

- *Visiting Scientist to the Condensed Matter Workshop, ICTP, Trieste Italy. June- August during 1983, 1985, 1987, and 1990.*

- *Visiting Scientist to the Louis Pasteur University, I.P.C.M.S. 23, Rue du Loess 67070 Strasbourg Cedex, France, for short periods during summers in 1983, 1985, 1986, 1987, 1991, 1994, 1995,2004.*

- *Associate Membership of the International Center for Theoretical Physics 1985-1990.*

- *President of the Jordanian Association of Physicists for the period August 1983- August 1985.*
- *Chairman, Department of Physics, University of Jordan, 1989-1990.*
- *Chairman, Department of Physics, University of Jordan, 2007-2009.*
- *Visiting research fellow, SERC fellowship, Warwick University, England, 1990-1991.*
- *Executive Committee of the IOTP Arab friends Society (SARF), Trieste, Italy.*
- *Visiting research fellow (Alexander von Humboldt fellowship) as follows:*
Institut Fur Kernphysik, Frankfurt, Germany March 1991.
Institut Fur Kernphysik, Frankfurt, Germany July - September 1991
Department of Theoretical Physics, Martin Luther University, Germany June - September 1994.
Department of Theoretical Physics, Martin Luther University, Germany June - September 1995.
- *In addition to the above, I have participated in several local and International Activities.*
- *Chairman of the 7th Petra School of Physics (Physics of New Materials), 2000.*
- *Member of Several Regional Activities (Palmera School of Physics, The Second Regional Conference on Magnetic and Superconducting Materials MSM-01, etc).*
- *Examining committees of many graduate students inside Jordan.*
- *Member of the Scientific Committee of the Applied Science University Journal.*
- *Member of the "Research Council" and "Trustees Council" of Middle East University for Graduate Studies, 2005-2009.*
- *Member of the Editorial Board of Jordan Journal of Physics (JJP).*
- *Scopus Recognition for my Contribution to Science, Amman- First of April, 2009.*
- *Local organizer for the RAS6054/9001/01, First coordination meeting Jordan, Amman 2009-06-07 - 2009-06-11. Regional Medical Physics MSc Program.*
- *Member of the National Committee of the International Geosphere-Biosphere Program (IGBP).*
- *Member of the "Research Council" of the Theoretical and Applied Physics Center at Yarmouk University.*
- *Regional Advisory Committee of the Palestinian Conference on Modern Trends in Mathematics and Physics II -AN-Najah National University, Nablus, Palestine Summer 2010.*

- German Jordanian University, Amman-Jordan, Sabbatica Year, 2010-2011.
- Scientific Editor of the Arabic version of "Physics, Principles and Applications" University Textbook by Giancoli (Obekan Research and Development-2010) 6th Edition.
- Scientific Editor of the Arabic version of "Conceptual Physical Science" University Textbook by Hewitt, Suchocki and Hewitt (Obekan Research and Development-2010) 6th Edition.
- ISI WEB of KNOWLEDGE, Recognition for my Contribution to Science,2011.

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Languages: *Arabic, English, and French.*

Research Work

My research interests include mainly the electronic structure of transition metal-based alloys:

- *The single electronic structure of impurities within the frame- work of the tight-binding approximation; a localized potential for the substitutional impurities and an extra-orbital Hamiltonian for the interstitial are usually used on our calculations.*
- *The electronic pair interactions such as the Hydrogen-Hydrogen, Hydrogen-Metal, and Metal-Metal impurities in transition hosts.*
- *Relaxation effects around point defects, i.e., field of forces, atomic displacements, and relaxation energies due to a single and a pair of impurities.*
- *My interest has been extended towards studying ion beam mixing of thin metallic or semimetallic films evaporated on the top of quartz substrates. The mixing process is indicated by a measurement of the receptivity of the film as a function of dose.*
- *In addition to the above, my current interest includes the mathematical derivations of Green's Function for different cubical periodic and disordered systems within the framework of the tight-binding approximation.*
- *Furthermore, my interest has been extended towards studying the magnetism of surfaces and interfaces using:(i) a real space recursion*

technique and (ii) ab-initio methods (TB-LMTO, FLAPW, etc) in collaboration with Dr. Demangeat group in Strasbourg (France) and Prof. P. Rennert in Halle (Germany).

- Recently, I'm also interested in investigating some problems related to catalytic surface reactions in collaboration with Prof. P. Legare (ECPM-Strasbourg-France).



PUBLICATIONS

1. M. A. Khan, J. Khalifeh and C. Demangeat, "Activation energy in α -palladium hydrides", *Phys. Lett.* **83A** (1981) 457.
2. J. Khalifeh, G. Moraitis and C. Demangeat, "The dipole force tensor in α -PdH", *J. Less. Comm. Met.*, **85** (1982) 171.
3. _____, "A simple tight-binding estimate of the dipole force tensor in α -palladium hydrides", *J. Phys.*, **43** (1982) 165.
4. _____, Workshop in "Hydrogen in metals: problems related to the impurity and to nonstoichiometric compound", *Rapport CECAM*, Paris (1982) 44-49.
5. _____, "Forces, dipole force tensor and elastic binding energy in α -palladium hydrides", *Int. Symp. on Hydrogen in Metals* (1982), eds Jena, Satterthwaite (New-York), Plenum, 1983) 119-124.
6. _____, "Elastic interaction of two hydrogen atoms in α -palladium hydrides, *Hydrogen in materials (H3)*", Paris (1982) 125-129.
7. M. A. Khan, J. Khalifeh, J. C. Parlebas and C. Demangeat, "Trapping effect on the hydrogen migration in α -palladium hydrides, *Hydrogen and materials (H3)*", Paris (1982) 503-508.
8. J. Khalifeh, and C. Demangeat, "The Metal-Hydrogen bond conference on Solid compounds of transition elements", Grenoble (1982).
9. J. Khalifeh, F. Gautier, "Asymptotic interaction between point defects in free-electron gas", *Phil Mag.* **B46** (1982) 635.
10. J. Khalifeh, G. Moraitis and C. Demangeat, "Elastic binding energy in α -PdH", *Phys. Lett.* **A93** (1983) 235.

11. J. Khalifeh and C. Demangeat, "Charge transfer in α -PdH", *Phil. Mag.* **B47** (1983) 191.
12. J. Khalifeh, "Size effect in simple metals", *Phys. Stat. Sol. (b)* **120** (1983) 161.
13. G. Moriaittis, J. Khalifeh and C. Demangeat, "Tight-binding calculation of force constants in α -PdH", *3e Reunion Generale de la Division Matiere Condensee de l'EPS, Lausanne* (1983).
14. J. Khalifeh, G. Moraitis, M. A. Khan and C. Demageat, "A step towards self-consistency in α -PdH", *International Meeting on Hydrogen in Metals, Wroclaw* (1983).
15. _____, "Binding energy of Hydrogen atoms in transition metals", *Phys. Chem. Sol. State: Application to Metal and their compounds* ed. P. Lacombe (Elsevier, Paris, 1984).
16. J. Khalifeh, G. Moraitis and C. Demangeat, "Crystal field effect in the determination of the dipole force tensor in transition metal based alloys", *Phil. Mag.* **B46** (1984) 533.
17. _____, "Tight binding calculations of force constants in α -PdH", *J. Less-Comm. Met.*, **101** (1984) 203.
18. J. Khalifeh, G. Moraitis and C. Demangeat, "Local environment of a Hydrogen atom in cubic transition metals", *Egyp. J. Solids* **7** (1985) 157.
19. _____, "Strain effect of hydrogen impurity in fcc transition metals", *Proc. Int. Symp. on Electronic Structure of Metals and Alloys, Technische Universitat, Dresden* (1985).
20. _____, "Electronic Structure of a single hydrogen interstitial in fcc ferromagnetic nickel", *Egyp. J. Sol.* **9** (1987).
21. Z. Badirkhan and J. Khalifeh, "Charge transfer in NiH system", *Phys. Stat. Sol. (b)* **143** (1987) 637.
22. Z. Badirkhan, J. Khalifeh and C. Demangeat, "Electronic Structure of NiH and its trapping by impurities", *J. Less-Comm. Met.* **130** (1987) 275; and *Int. Symp. on the Prop. and Appl. of Metal hydrogen, V, Maubuisson, France* (1986) P. 275.
23. J. Khalifeh, "H-H Chemical Interaction in nickel", *Phil. Mag.* **B58** (1988) 111.
24. _____, "Trapping of hydrogen by 3d-transition metal impurities in ferromagnetic nickel", *J. Phys. F: Metal Phys.* **18** (1988) 1527.
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26. B. Shadid, J. Khalifeh and C. Demangeat, "Effect of the bound State on the chemical binding energy of hydrogen with point defect in α -PdH". *Conference Metal-Hydrogen*

systems, Stuttgart, 4-9 Sept. (1988) B. Shadid and J. Khalifeh, 2nd Conf. on Condensed Matter (1989) Amman.

27. A. J. Abu El-Haija, K. A. Saleh, D. E. Arafeh, N.A. Halim, M. R. Kamal, J. Khalifeh and N.S. Saleh, "Quantitative analysis of Stainless Steel using nuclear techniques", *Mater. Sci. Eng.*, 95 (1987) 267.

28. A. J. Abu El-Haija, K. A. Saleh, D. E. Arafeh, N.A. Halim, J. Khalifeh, and N. S. Saleh, "Study of ion beam induced mixing in Sn/Si system using electrical resistivity measurements", *JRNC*, 120 (1988) 387.

29. _____, "Study of ion beam mixing in Sb/Si system using electrical receptivity measurements", *Appli. Phys. Comm.* 7 (1987)301.

30. _____, "Ion beam mixing in Cu/Si system using Electrical receptivity measurements", *Phys. Stat. Sol. (a)*, 106 (1988) 651.

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36. D. Homouz and J. Khalifeh, "Magnetism of relaxed V(001) slabs", *JMMM* 153(1996)355.

37. J.Khalifeh, "C(2x2) Antiferromagnetic Superstructure of Mn Overlayers on Pd(001)", *JMMM* 159(1996)201.

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39. H. Dreysse, A. Vega, D. Stoeffler, J. Khalifeh and C. Demangeat, "Magnetism of transition metal overlayers: Fe/Cr stepped surfaces" *Surfaces, Vacuum, and their Applications* "378 (1996)482.

40. K.M. Khan, J. Khalifeh, K. Yaldram, H.A. Khan, "Subsurface effects in Catalytic reactions", *J.Chem. Phys.* 106(1997)8890.

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49. B. A. Hamad and J. M. Khalifeh, “Spin polarization of Cr/V vicinal structures”, *Surface Science* (2001), 492(1-2), 161-166.
50. J. M. Khalifeh and C. Demangeat, “Cr monolayer on vicinal Pd surfaces”, *Surface Science* (2001), 492(3), 235-242.
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56. N. T. Shawagfeh and J. M. Khalifeh , , “Electronic and magnetic structures of Ni/Fe(0 0 1) overlayers: first-principles study”. *Physica B: Condensed Matter (Amsterdam, Netherlands)* (2002), 321(1-4), 222-229.

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61. B. A. Hamad, T. Khajil, and J. M.Khalifeh, “Magnetism of alloyed models of $\text{Cr}(\text{Mn})_x\text{V}_{1-x}$ and $\text{Mn}_x\text{Cr}_{1-x}$ overlayers on V (001) substrates”, *European Physical Journal B: Condensed Matter Physics* (2002), 29(3), 497-501.
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64. M.A. Abbadi; I.I. Al-Qasir and J.M. Khalifeh, “Three-Parameter Wave Functions for $ns^2 -$ Orbitals in Alkali-Metal Negative Ions”, *Int. J. Theor. Phys.*(2003), 42(7), 1629-1639.
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68. - B. A. Hamad and J, M. Khalifeh, " Spin Polarization of Cr/Ir vicinal Structures", *J. Phys.: Condens. Matter* (2003) **15** , 8157-8163.
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77. A. M. Bakir, B. A. Hamad and J. M. Khalifeh, "Surface and interface magnetism of V/W systems", phys. stat. sol. (c) **242**, 12(2005) 2522 - 2529.
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79. J. H. Asad, R. S. Hijjawi, A. Sakaji and J. M. Khalifeh, "Infinite Network of Identical Capacitors by Green's Function", Int. J. Modern Phys. **B 19**(2005) 3713-3721.
80. K. M. Tarawneh, B. A. Hamad and J. M. Khalifeh, "Dimensional and Proximity Magnetic Effects in Cr/V Systems", Surface Physics **600**(2006) 1026-1033.
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102. Ramanathan, A. A.; Khalifeh, J. M., "Magnetism of A V monolayer on Nb(001): a first principles calculation" ,TMS 2010, Annual Meeting & Exhibition, Supplemental Proceedings, 139th, Seattle, WA, United States, Feb. 14-18, 2010 (2010), 3, 63-68.
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104. Ramanathan, A. A.; Khalifeh, J. M.; Hamad, B. A. , "A DFT study of substrate effect on the magnetism of the V(001)surface", Surface Science, 605,11-12(2011)1074.
105. I. A. Erikat, B. A. Hamad and J. M. Khalifeh, "A density functional study on adsorption and dissociation of O₂ on Ir(1 0 0) surface", Chemical Physics. **385** (2011) 35–40.
106. S. S. Azar, B. A. Hamad and J. M. Khalifeh, " Structural, Electronic and Magnetic Properties of Fe_{3-x}MnxZ (Z=Al, Ge, Sb) Heusler Alloys", JMMM(2012), accepted.
107. E. K. Jaradat, R. S. Hijjawi and J. M. Khalifeh, "Maxwell's Equations and Electromagnetic Lagrangian Density in Fractional Form", JMP(2012), accepted.
108. Bothina Hamad • Jamil Khalifeh • Qing-Miao Hu •Claude Demangeat "Electronic and magnetic properties of Fe₃₂xCr_xSi ordered alloys from first principles", J Mater Sci (2012) 47:797–803.
109. 27. I.A. Erikat a, B.A.Hamad, J.M.Khalifeh, Coadsorption of CO and O on Ir(1 0 0): First principles calculations, Physica B 407 (2012) 468–471.
110. M. Q. Owaidat, R. Hijjawi and J. M. Khalifeh, "Network with Two Extra Interstitial Resistors", Int. J. Theor. Phys.(2012) accepted.

Graduate Programs:

I have directed the research of several students at the University of Jordan. Below are the titles:

- 1- Z. Badirkhan, “ *The Electronic Structure of Dilute Hydrogen in Nickel*”, M.Sc., July 1986.
- 2- B. Shadid, “ *Electronic pair Interactions in Paramagnetic Transition Metals*”, M.Sc., March 1989.

- 3- R. Zeitoun, "*Green`s Functions for Simple Cubic Lattices*", M.Sc., December 1991.
- 4- A. Sakaji, "*Green`s Function for Point Defects in Cubic Lattices*", M.Sc., May 1994.
- 5- D. Homouz, "*Magnetism of Layered Transition Metals*", M.Sc., May 1994.
- 6- O. Al- Alem, "*The Study of Magnetic Moments in Chromium Cr Thin Films Grown on Iron Fe Substrate using the Tight-Binding Approach*", M.Sc, July 1997.
- 7- S. Elayyan, "*A Study of Magnetic Moments of BCC Nickel Films on BCC Iron: Tight-Binding Method*", MSc., July 1997.
- 8- N. Bany Hani, "*Application of a Variational Method to Calculate the Binding Energy of the Extra Electron in Atomic Ions having two Outer Equivalent p-Electrons*", M.Sc., May 2000.
- 9- Y. Shoayb, "*Spin polarization of Cr/Mn systems*", M.Sc., May 2001.
- 10- M. Hussain, "*Pair Distribution Function for A Gas Model*", M.Sc., May 2001.
- 11- B. Hamad, "*Magnetic Structure of Transition - Metal Surfaces*", Ph.D., May 2001.
- 12- R. Hijjawi, "*Green`s Function for a Point Defect in Simple Cubic, Face Centered Cubic and Tetragonal Lattices*", Ph.D., May 2002.
- 13- N. Shawagfeh, "*Electronic and Magnetic Structure of bcc-Transition Metals on Fe(001): A First Principle Study*", Ph.D., May 2002.
- 14- I. Al-Qasir, "*Laser Spectroscopy of Alkali-Metal Anions Using a Correlated Theoretical Model*", M.Sc., July 2002.
- 15- K. Tarawneh, "*Magnetic Structure of Cr/V System*", M.Sc., August 2003.
- 16- R. Nasrallah, "*Spin polarization of Mn-V systems*", M.Sc, January 2004.
- 17- J. Asad, "*Resistance Calculation of an Infinite Network of Resistors- Application on Green`s Function*", Ph.D., May 2004.
- 18- R. Faouri, "*Dirac Delta Function Derivatives Potential*", M.Sc, January 2005.
- 19- N. Bakir, "*Spin Polarization of V Overlayers on W Substrate*", M.Sc, January 2005.
- 20- M. Abd al-Salam "*First principles study of some physical properties of transition metal monosilicides*", Ph.D., 2006.
- 21- B. Qassem, "*Investigation of Interlayer Exchange Coupling Across Metallic Spacer Layers*", Ph.D., January 2007.

- 22- A. Ramanathan, "Study of Magnetic in Transition Metal Nanostructures Using Ab-Initio Methods", Ph.D., January, 2008.
- 23- G. Ameerah, "Electronic and Magnetic Structures of $M(\text{Si,Ge})$ with $M = \text{Co, Ni, Fe}$ in the B20-type Structure", Ph.D., 2008.
- 24- A. Diab, "Conductance through Simple Molecules between Metallic Contacts", Ph.D., 2008.
- 25- E. Jaradat, "Electromagnetic Lagrangian Density: Fractional Formulation", Ph.D., 2009.
- 26- A. Mousa, "A Theoretical Study of the Electronic and Elastic Properties of Shape Memory Alloys(SMA)", Ph.D., 2009.
- 27- A. Mubarak, "Effect of Hydrogen on Electronic and Magnetic Structures of Transition Metals Surfaces", Ph.D., 2009.
- 28- M. Dalabeeh, "Connection between the Perturbative Chern-Simons Theory and the Penner Model", Ph.D., 2010.
- 29- M. Q. Owaidat, "Impedance Calculation of Infinite Networks using Lattice Green's Functions: Perfect and Perturbed Lattices", Ph.D., 2010.
- 30- M. Shtaiyah, "The Exact Behavior of Electromagnetic Faraday Rotation in Colliding Waves in General Relativity", M.Sc., 2010.
- 31- A. Haidari, "First-Principles Investigation of Oxygen Adsorption on Fcc (110) Transition-Metal Surfaces", M.Sc., 2010.
- 32- S. S. Azar, "Investigation of Half-Metallic Behavior and Spin Polarization for the Heusler Alloys $\text{Fe}_{3-x}\text{Mn}_x\text{Z}(\text{Al,Ge,Sb})$: A First Principles Study", Ph.D., 2011.
- 33- M. Ajjour, "Resistance Calculation of Infinite Networks Using Lattice Green's: Perfect and Perturbed Lattices", M.Sc.
- 34- N. Talal, "Theoretical Investigation of the Electronic and Magnetic Properties of (Co_2VSn) Full Heusler alloy: First Principles Calculation.", MSc.

Teaching:

In addition to the previous activities, I have frequently taught the following courses:

M.Sc.+Ph.D.

Subject

Course No.

Programs:

Quantum Theory of Solids

302971

<i>Advanced Quantum Chemistry</i>	303941
<i>Advanced Solid State Physics</i>	302771
<i>Advanced Quantum Mechanics</i>	302754
<i>Advanced Mathematical Physics</i>	302781
<i>Advanced Mathematical Physics</i>	302981
<i>Seminar Project</i>	302791
<i>Advanced Statistical Mechanics</i>	302756
<i>Advanced Electrodynamics</i>	302753

B.Sc. Program:

<i>Solid State Physics</i>	302471
<i>Electricity and Magnetism</i>	302453
<i>Advanced Experimental Physics</i>	302411
<i>Seminar</i>	302491
<i>Mathematical Physics</i>	302381
<i>Quantum Mechanics</i>	302354
<i>Electricity and Magnetism</i>	302353
<i>Classical Mechanics</i>	302351
<i>Mathematical Physics</i>	302281
<i>Classical Mechanics</i>	302251
<i>Electronics</i>	302231
<i>Electricity and Magnetism</i>	302253
<i>Waves and Vibrations</i>	302222
<i>General Physics -1</i>	302101
<i>General Physics -2</i>	302102
<i>General Physics</i>	302107
<i>Calculus</i>	301101, 301102
<i>Applied Mathematics</i>	201
<i>Freshman Practical Physics</i>	302111, 302112,
<i>etc</i>	302113