

Gassem Alzoubi, PhD

Curriculum vitae

Gassem Alzoubi

Associate Professor of Physics
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Citizenship: Jordanian Date of birth: Dec, 19, 1973 Marital Status: Married



Work & Teaching Experience

2021-present	Associate Professor of Physics, the Hashemite University, Jordan
2015- 2021	Assistant Professor of Physics, the Hashemite University, Jordan
2010-2015	Assistant Professor of Physics, King Faisal University, Saudi Arabia
2008– 2009	Science Coordinator & Physics Instructor, Khalifa University of Science, Technology and Research, Abu Dhabi, UAE
2007-2008	Assistant Professor of Physics, Dubai Aerospace Enterprise University, Dubai, UAE

Education

2007	PhD Summer 2007, Physics, Michigan State University, East Lansing, MI (Thesis title: Magnetic Scattering in Dilute AgFe Kondo Wires Below the Kondo Temperature)
2003	MS, Summer 2003, Physics, Michigan State University, East Lansing, MI
1995	BS, Physics, Yarmouk University, Irbid, Jordan

Research Interests

- Fabrication and characterization of nanomaterials and nanostructures, mainly thin films, nanowires, carbon nanotubes, and Graphene
- Fabrication and characterization of High Temperature Superconductors
- Fabrication and characterization of magnetic nanoparticles

Research Grants

- **High Temperature Superconductors (2016):** The title of the project is *Fabrication and Characterization of Nanocrystalline High Temperature $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ (YBCO) Superconductors*. The general purpose of this project is to fabricate samples of nanocrystalline high temperature Yttrium Barium Copper Oxide $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ (YBCO) superconductors using the ball milling technique and characterize their structural, electrical and magnetic properties. The project is supported by the Deanship of Scientific Research @ The Hashemite University with a budget of around **\$135,000**.
- **Magnetic Tunnel Junctions (2017):** The title of the project is *Fabrication and Characterization of MgO -based Magnetic Tunnel Junctions*. The initial goal of this project is to produce a specific, reproducible recipe for making MTJs on a silicon substrate and manipulate their magnetic properties. This is a strategic research proposal that is supported by the Deanship of Scientific Research @ The Hashemite University with a budget of around **\$700,000**.
NB: the project was stopped in 2018 due to technical and financial issues
- **Ferrite Nanoparticles Synthesis (2017):** The title of the project is *Hydrothermal Synthesis and characterization of Superparamagnetic/Ferrimagnetic Cobalt Ferrite Nanoparticles*. The initial goal of this project is to produce a specific, reproducible recipe for making CoFe_2O_4 nanoparticles by hydrothermal method and manipulate their magnetic properties. The project is supported by the Deanship of Scientific Research @ The Hashemite University with a budget of around **\$17,500**.
- **Graphene Field Effect Transistors (2011):** The title of the proposal is “*Fabrication and characterisation of double-gated graphene field effect transistors on hexagonal boron nitride substrate and manipulation of their properties* “. This project was based on collaboration between King Faisal University and Center of Nanoscale Materials at the Argon National Laboratory. In this project, graphene devices were to be grown on SiO_2 silicon substrate. The experimental challenge in this work was to optimize the procedure of contacting graphene devices using electron beam lithography. The Raith ELPHY Plus nanolithography system (provided by Raith Nanofabrication; Germany) was utilized to pattern leads and pads on graphene devices. Graphene devices were to be electrically characterized using Physical Property Measurement System (PPMS) that had been ordered. This project was supported by King AbdelAziz City for Science and Technology, Saudi Arabia, with budget of around **\$530,000**.

Research Skills

- Fabrication and characterization of magnetic nanoparticles synthesized by co-precipitation, hydrothermal, mechanical alloying, and solid state reactions methods. Characterization methods include XRD, VSM, FTIR, SEM, TEM, XPS
- **Electron beam lithography** (4 years experience of using a combination of JEOL SEM and NPGS lithography system back at Michigan State University and 2 years experience in using a combination of JEOL SEM and Raith ELPHY Plus nanolithography system at King Faisal University; capable of fabrication of nanostructures down to 20 nm)
- **Photolithography** (capable of fabrication of devices and circuits down to submicron range; 4 years experience in using the the AB-M mask aligner back at Michigan State University; trained to use Autocad to design masks for optical lithography)
- Thin films deposition ; thermal evaporation, electron beam evaporation, and sputtering
- Optical spectroscopy down to submicron scale
- Atomic Force Microscopy (AFM).
- Low-noise measurement techniques, including lock-in amplifiers and filtering
- Low-noise measurement techniques using Quantum Design PPMS equipped with VSM
- Cryogenic systems, including He3-He4 dilution refrigerator able to cool to 35 mK.
- High-Vacuum systems (10^{-8} Torr), including roughing and diffusion pumps.
- Designed and built electronics (sum box), which is used in tunneling measurements, to break the ground of two input signals (DC and AC components) and add their amplitudes together with specified gains.
- Designed and built electronics (regulation box), to battery operate the NF LA-75 low-noise preamplifiers.
- Probing the nonequilibrium nanotubes were grown at University of Illinois and the tunneling measurements were performed at MSU (2006-2007) distribution function in metallic Single Wall Carbon Nanotubes (SWCN).

Publications

- Sufian Alnemrat, Warren W. Tomlinson, Khaled Y. Mustafa, **Gassem M. Alzoubi**. *Theoretical study of intrinsic ferromagnetic to antiferromagnetic switching in two-dimensional Fe/CoCl₂ monolayers encapsulated in UiO-67 MOF via edge termination*. Solid State Communications 404, 116049 (2025). <https://doi.org/10.1016/j.ssc.2025.116049>
- **Gassem M. Alzoubi**, Mohamed K. Al-Sugheir, Sufian Alnemrat, Ahmad S. Masadeh. *Determination of critical size of superparamagnetism in as-prepared crystalline cobalt ferrite nanoparticles using magnetic measurements*. Appl. Phys. A 131, 623 (2025). <https://doi.org/10.1007/s00339-025-08765-8>
- Mohamed K. Al-Sugheir¹, Bassam R. Joudeh, Ghassan Alna'washi¹, Mohammad M. Shorman, **Gassem M. Alzoubi**, Humam B. Ghassib. *Thermodynamic properties of harmonically trapped sodium ²³Na gas in one dimension*. Eur. Phys. J. Plus **140**, 612 (2025). <https://doi.org/10.1140/epjp/s13360-025-06556-x>

- Ahmad S. Masadeh, [Gassem M. Alzoubi](#), Moneeb T. M. Shatnawi, Osama Abu-Haija, Ziad Abu Waar, Yang Ren, *Toward an Understanding of the Anisotropy in Hcp Zinc Metal: Total Scattering Structural Study Using Synchrotron-Based, Temperature-Dependent, X-Ray Pair Distribution Function Analysis*, Jordan Journal of Physics 17 (1), 7-15 (2024). <https://doi.org/10.47011/17.1.2>
- [Gassem M. Alzoubi](#), *The Effect of Co-Doping on the Structural and Magnetic Properties of Single-Domain Crystalline Copper Ferrite Nanoparticles*, Magnetochemistry. 8(12), 164 (2022). <https://doi.org/10.3390/magnetochemistry8120164>
- Ahmad S. Masadeh, Moneeb T. M. Shatnawi, Ziad Y. Abu Waar, [Gassem M. Alzoubi](#), and Yang Ren, *Real space study of local bonding for zinc structure based on emperature-dependent x-ray pair distribution function analysis*, AIP Advances, 12, 095313 (2022), <https://doi.org/10.1063/5.0104904>
- [Gassem M. Alzoubi](#), Ahmad S. Masadeh, Moneeb T. M. Shatnawi, *Investigation of the structural, morphological, and magnetic properties of small crystalline Co--Cu ferrite nanoparticles in the single-domain regime*, AIP Advances. 12(6), 065101 (2022). <https://doi.org/10.1063/5.0087446>
- [Gassem M. Alzoubi](#), *Hydrothermal Synthesis of Single-Domain Zinc Ferrite Nanoparticles (ZnFe₂O₄): Structural, Morphological, and Magnetic Studies*, Journal of Superconductivity and Novel Magnetism **35**, 2417–2424 (2022). <https://doi.org/10.1007/s10948-022-06230-8>
- [Gassem M. Alzoubi](#), *Observation of Spin-Glass-like Behavior over a Wide Temperature Range in Single-Domain Nickel-Substituted Cobalt Ferrite Nanoparticles*, Nanomaterials. 12(7), 1113 (2022). <https://doi.org/10.3390/nano12071113>
- G.A. Alna'washi, A.M. Alsmadi, I. Bsoul, B. Salameh, [Gassem M. Alzoubi](#), M. Shatnawi, S.M. Hamasha, S.H. Mahmood, *Investigation on X-ray photoelectron spectroscopy, structural and low temperature magnetic properties of Ni-Ti co-substituted M-type strontium hexaferrites prepared by ball milling technique*, Results in Physics, Volume 28, 104574 (2021). <https://doi.org/10.1016/j.rinp.2021.104574>
- [Gassem M. Alzoubi](#), B. A. Albiss, M. Shatnawi, I. Bsoul, A. M. Alsmadi1, B. Salameh, G. A. Alna'washi1, *Influence of High-Temperature Annealing on Structural and Magnetic Properties of Crystalline Cobalt Ferrite Nanoparticles in the Single-Domain Regime*, Journal of Superconductivity and Novel Magnetism. 33, 3179–3188 (2020). <https://doi.org/10.1007/s10948-020-05551-w>
- [Gassem M. Alzoubi](#), A. M. Alsmadi1 , G. A. Alna'washi1, B. Salameh , M. Shatnawi1, Sufian Alnemrat1, B. A. Albiss, I. Bsoul, *Coexistence of superparamagnetism and spin-glass like behavior in zinc-substituted cobalt ferrite nanoparticles*, Applied Physics A. 126, NO 512, 1-11 (2020). <https://doi.org/10.1007/s00339-020-03655-7>
- G. A. Alna'washi1, A. M. Alsmadi, I. Bsoul, [Gassem M. Alzoubi](#), B. Salameh, M. Shatnawi, F. M. Al-Dweril, S. H. Mahmood, *Magnetic Study of M-type Co-Ti Doped*

- Strontium Hexaferrite Nanocrystalline Particles*, Journal of Superconductivity and Novel Magnetism. 33, 1423–1432 (2020). <https://doi.org/10.1007/s10948-019-05334-y>
- **Gassem M. Alzoubi**, *Probing the structural and magnetic properties of small crystalline nickel ferrite nanoparticles near the upper size limit of the single-domain regime*, ADVANCES IN APPLIED CERAMICS, VOL. 119, NO. 4, 224–232 (2020). <https://doi.org/10.1080/17436753.2020.1759923>
 - M. Shatnawi, A.M. Alsmadi, I. Bsoul, B. Salameh, M. Mathai, G. Alnawashi **Gassem M. Alzoubi**, F. Al-Dweri, M.S. Bawa'aneh, *Influence of Mn doping on the magnetic and optical properties of ZnO nanocrystalline particles*, Results in Physics. 6, 1064–1071(2016). <https://doi.org/10.1016/j.rinp.2016.11.041>
 - Yung-Fu Chen, Travis Dirks, **Gassem Al-Zoubi**, Norman O. Birge, and Nadya Mason, *Nonequilibrium Tunneling Spectroscopy in Carbon Nanotubes*, Phys. Rev. Lett. 102, 036804 (2009). <https://doi.org/10.1103/PhysRevLett.102.036804>
 - **Gassem M. Alzoubi** and Norman O Birge, *Phase Coherence of Conduction Electrons Below the Kondo Temperature*, Phys. Rev. Lett. **97**, 226803 (2006). <https://doi.org/10.1103/PhysRevLett.97.226803>

Teaching Experience:

At the Hashemite University

- Graduate Quantum Mechanics (Phys 761)
- Graduate Statistical Mechanics (Phys 741)
- Graduate Condensed Matter Physics (Phys 771)
- Mathematical Physics I and II (Phys281 and Phys282)
- Statistical Mechanics (Phys 442)
- Quantum Mechanics I and II (Phys 362 and Phys 364)
- Electrodynamics I and II (Phys 331 and Phys 332)
- Thermodynamics (Phys 341)
- Heat and Material Physics (Phys 141)
- Introductory Physics (Mechanics Phys 101)
- Introductory Physics (Electricity and Magnetism Phys 102)
- General Medical Physics (Phys 109)

At King Faisal University

- Introductory Physics (mechanics Phys 101 & Electricity and Magnetism Phys 102)
- Advanced Solid State Physics Lab (Phys 306)
- Solid State Physics (Phys 401)

At Khalifa University

- Coordinating Science Courses (Physics, Math, & Computer Technology) & Teaching Introductory Physics

At DAE University:

- Built *Mechanics, electricity and optics* labs from scratch at DAE University, 2007-2008
- Phys 110E : Physics for Scientists and Engineers (Mechanics), DAE University, Fall 2007
- Phys 110EL : Mechanics Lab for Engineers, Fall 2007
- Phys 110 : College physics I (Mechanics), DAE University, Fall 2007

- Phys 111 : College physics II (electricity and optics), DAE University, Spring 2008
- Phys 111L : Electricity and optics Lab, DAE University, Spring 2007

At Michigan State University:

- Lab Instructor for PHY 451, Advanced Lab course for senior physicists, Michigan State University (MSU), Spring 2005.
- Lab Instructor for PHY 440, Electronics course for Junior/Senior physicists, Michigan State University, Spring 2004.
- Lab Instructor for PHY 192, Modern Physics course for second year physics majors, Michigan State University, Spring 2003.
- Lab Instructor for PHY 191, Classical Mechanics course for second year physics majors, Michigan State University, Fall 2002.
- Lab Instructor for PHY 252, Electricity and Optics course for first year physics majors, Michigan State University, Fall 2001 and Spring 2002.

Professional Memberships

- American Physical Society (APS)
- Jordanians Alumni of North America (JANA)

Committees:

- Graduate Studies and Scientific Research Committee, the Hashemite University, Jordan
- Quality Assurance and Comprehensive Exam Committees, King Faisal University, Saudi Arabia
- Science Academic Committee (Chair), Khalifa University
- University Curriculum committee (DAE University)
- Academic Senate (DAE University)

Conferences

- ***From Semiconductors to Proteins : Beyond the Average Structure***, held July 28-August 1, 2001, Traverse city, Michigan, USA.
- Third NTT-BRL School, Atsugi City, Japan (Oct, 31 – Nov, 4, 2005), ***”Decoherence and Noise in Quantum Systems”***
- Oral presentation given at DAE University, Dubai, UAE (May, 2008), ***”Introduction to nanotechnology from physic point of view”***
- Oral presentation given at 2007 APS March meeting, Denver, Colorado, ***”Phase Coherence of Conduction Electrons Below the Kondo Temperature”***, Session J23: Metals: Actinides and Transport, Volume 52, Number 1, Tuesday, March 6, 2007, Colorado Convention Center Room: 110
- Attended 2005 APS March meeting, Los Angeles, California.
- The 10th International Petra School of Physics (PSP10), “Quantum Computing : Theory and Applications”, 9-13 October 2023, Amman, Irbid, Petra, Jordan

Scholarships/Fellowships

- TA and RA, Michigan State University, 2001-2007
- PhD completion fellowship, Summer 2007

Invited Reviewer for International Journals

- Applied Physics A, Springer
- Jordan Journal of Physics

References :

- **Norman Birge, Professor of Physics, (PhD supervisor)**
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Michigan State University, East Lansing, MI
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- **Prof. Dr. Khaled H. Abu-Elteen, Vice president for academic affairs,**
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