Ibraheem Faisal Al-Yousef

Senior Undergraduate Physics Student
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GitHub LinkedIn

EDUCATION

B.S. in Physics, King Fahd University of Petroleum and Minerals (KFUPM) `Expected 2023/09`

PUBLICATIONS

Ibraheem F. Al-Yousef, Moayad Ekhwan, H. Bahlouli, and A. D. Alhaidari, "Quantum Mechanics Based on Energy Polynomials," Jan 2023. Under review for *Axiom's special issue: Computation Methods in Quantum Mechanics*. doi: 10.20944/preprints202301.0545.v1

RESEARCH EXPERIENCE

Condensed Matter Theory Worked on solving prototypical quantum spin Hamiltonians in the language of Jordan-Wigner fermions. With a proposal of using Jordan-Wigner fermions to exactly solve an extension of Kitaev honeycomb model. Under the supervision of Dr. Michael Vogl. [Reasearch Proposal]

`KFUPM, Aug 2022 - Jan 2023`

Alternative Formulation of Quantum Mechanics (Background) Working with Prof. Bahlouli and Prof. Alhaidari in problems related to the formulation of quantum mechanics based on orthogonal polynomials.

`KFUPM, Feb 2022 - Present`

Smart Thin Films Working on the fabrication and characterization of smart thin films for light emitting display applications, as part of the undergraduate student research grant. Under the supervision of Dr. Kamal Hossain.

`IRC-REPS KFUPM, Feb 2023 - Present`

COMPUTATIONAL SKILLS

Mathematica Expert in Mathematica for a wide range of tasks, including both symbolic and numerical calculations, and simulating classical and quantum physics problems, as well as in my research on condensed matter and mathematical physics. [Samples]

Python Competent in using Python for computational physics and chemistry, with experience in quantum and classical methods such as Hartree-Fock and Monte Carlo. [Samples]

LaTeX Proficient in using LaTeX to create high-quality academic reports and presentations, with strong typesetting skills and expertise in customizing document styles using packages and templates. [Samples]

ADVANCED UNDERGRADUATE COURSES

Undergraduate Research (PHYS497) Second quantization; Jordan-Wigner transformation; Bogoliubov diagonalization; Phase diagrams; Correlation functions.

Solid State Physics (PHYS432) Crystal bonding; Lattice vibrations; Thermal properties of insulators; Free electron theory of metals; Band theory; Semiconductors; Superconductivity.

Physics of Semiconductor Devices (PHYS336) Energy band diagrams; PN junctions; Light Emitting Diodes; Semiconducting Laser Diodes; Photo detectors; MOSFET and JFET; Solar-cells; Bipolar transistors.

Computational Physics (PHYS373) Monte Carlo simulations; Simulation techniques; Programming methods; Comparison of ideal and realistic systems; Limitations of physical theory.

Computational Chemistry (CHEM313) Hartree-Fock theory; Density Functional Theory; Molecular Mechanics; Molecular Dynamics; Monte Carlo simulations; Conformation search.

WORK EXPERIENCE

Medical Physicist Trained for two months as a Medical Physicist in medical imaging and nuclear medicine, gaining valuable exposure to quality assurance and control duties, and developing a strong understanding of the importance of ensuring safe and effective medical treatments.

`King Fahad Specialist Hospital in Dammam, Jun 2022 - Aug 2022`

Physics Grader Worked as a part-time job grader for PHYS102. This work experience has further enriched my knowledge in physics and exposed me to a vital part of the teaching experience.

`KFUPM, Feb 2022 - Jun 2022`

VOLUNTEERING

Physics Club's President Currently serving as President of the Physics Club at KFUPM, honing leadership and teamwork skills in physics-related contexts and contributing to the success of the club's initiatives.

`KFUPM, Aug 2022 - Present`

Committee Member Selected to be serving on the Islamic Affairs Committee at KFUPM, gaining valuable experience in addressing issues related to the university's Islamic community while developing cultural sensitivity and community engagement skills.

`KFUPM, Aug 2022 - Present`

HARD & SOFT SKILLS

- ⊙ Leadership
- ⊗ Teamwork
- ⊕ Presentation
- ⊙ Research
- ⊙ Competitiveness
- ⊗ Teaching
- ⊕ Critical thinking
- ⊙ Problem Solving

PROFESSIONAL CERTIFICATIONS

‡ Business for Science and Engineering
`KFUPM, Feb 2023`

‡ LabVIEW Programming
`KFUPM, Mar 2022`

‡ Data Analysis Using Python
`KFUPM, Oct 2021`

‡ Business Skills Training
`KnowledgeHut upGrad, Jun 2020`

‡ Soft Skills Training
`KnowledgeHut upGrad, Jun 2020`

REFERENCES

Prof. Hocine Bahlouli
Professor · Theoretical Condensed Matter ·Physics Department, KFUPM
Email: bahlouli@kfupm.edu.sa Phone: (966)013-860-2097
Prof. Bahlouli [Website, Scholar] is my instructor for three undergraduate courses: quantum mechanics I and II as well as classical mechanics.

Dr. Michael Vogl
Assistant Professor · Theoretical Condensed Matter ·Physics Department, KFUPM
Email: michael.vogl@kfupm.edu.sa Phone: (966)013-860-4056
Dr. Vogl [Website, Scholar, arXiv] is my undergraduate research supervisor.

Dr. Saeed Al-Marzoug
Assistant Professor · Bose Einstein Condensate and Nonlinear Physics ·Physics Department, KFUPM
Email: marzoug@kfupm.edu.sa Phone: (966)013-860-7316
Dr. Al-Marzoug [Website, arXiv] is my advisor.