

Ibraheem Faisal Al-Yousef
Senior Undergraduate Physics Student
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EDUCATION

B.S. in Physics, King Fahd University of Petroleum and Minerals (KFUPM)

Expected Spring 2022

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. [[Research Proposal](#)]

KFUPM, Aug 2022 - Dec 2022

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

COMPUTATIONAL SKILLS

Mathematica Done multiple numerical projects including quantum and classical physics using Mathematica. Mainly on symbolic calculations, derivations, and visualizations. [[Samples](#)]

Python Used in computational chemistry course, in calculating atomic and molecular properties using a variety of quantum and classical methods including Hartree-Fock, and Monte Carlo. [[Samples](#)]

L^AT_EX I have been using L^AT_EX to typeset all of my academic reports and presentations. [[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 as medical physicist for two months in medical imaging & nuclear medicine sections. This experience exposed me to the duties of medical physicists and the challenges they face.

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 Worked as the president of the physics club at KFUPM for a year. This experience has helped me to be a contributing team member and leader, especially in physics related areas.

KFUPM, Aug 2022 - Present

Committee Member Was nominated, and selected, to be a member of the Islamic Affairs Committee at KFUPM. This experience has exposed me to the issues and resolutions related to KFUPM Islamic community.

KFUPM, Aug 2022 - Present

HARD & SOFT SKILLS

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

PROFESSIONAL CERTIFICATIONS

‡ Data Analysis Using Python

KFUPM, Oct 2021

‡ LabVIEW Programming

KFUPM, Mar 2022

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.