

# Ibraheem Faisal Al-Yousef

Senior Undergraduate Physics Student

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[GitHub](#) [LinkedIn](#)

## EDUCATION

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B.S. in Physics, King Fahd University of Petroleum and Minerals (KFUPM), expected to graduate in Spring 2022.

## RESEARCH EXPERIENCE

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**Condensed Matter Theory** Working on analytical Jordan-Wigner solutions in condensed matter theory. Specifically, using Jordan-Wigner transformation to exactly solve models related to the Kitaev honeycomb model. Under the supervision of Dr. Michael Vogl, KFUPM, Aug 2022-present.

**Alternative Formulation of Quantum Mechanics** ([Background](#)) Working with [Prof. Bahlouli](#) and [Prof. Al-haidari](#) in problems related to the formulation of quantum mechanics based on orthogonal polynomials, KFUPM, Feb 2022-present.

## COMPUTATIONAL SKILLS

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**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, Monte Carlo, and DFT. [[Samples](#)]

**L<sup>A</sup>T<sub>E</sub>X** I have been using L<sup>A</sup>T<sub>E</sub>X to typeset all of my academic reports and presentations. [[Samples](#)]

## ADVANCED UNDERGRADUATE COURSES

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**Undergraduate Research** (PHYS497) Second Quantization; Jordan-Wigner Transformation; Bogoliubov Transformation; Phase Diagrams; Correlation Functions.

**Computational Chemistry** (CHEM313) Hartree-Fock Theory; Density Functional Theory; Molecular Mechanics; Molecular Dynamics; Monte Carlo simulations; Confirmation Search.

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

## WORK EXPERIENCE

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**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.

**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 part of the teaching experience.

## REFERENCES

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### **Prof. Hocine Bahlouli**

*Professor · Theoretical Condensed Matter · Physics Department, KFUPM*

Email: [bahlouli@kfupm.edu.sa](mailto: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](mailto: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*

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Dr. Al-Marzoug [ [Website](#), [arXiv](#) ] is my advisor.