Saad Bezoui

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Education

CUNY Hunter College **Jan. 2023 – May 2024**
Masters in Applied Mathematics GPA: 3.4 *New York, New York*

CUNY Hunter College **Aug. 2019 – May 2024**
Bachelor of Arts in Physics & Mathematics GPA: 3.4 *New York, New York*

Relevant Coursework

- Classical Mechanics
- Electricity & Magnetism
- Stochastic Optimizations
- Theory of Functions of Real Variables
- Linear Algebra
- Calculus on Manifolds
- Quantum Mechanics
- Abstract Algebra
- Statistical Mechanics/Thermodynamics
- Mathematical Methods for Physical Sciences

Experience

Michigan State University (SROP Program) **May 2022 – August 2022**
Research Intern *East Lansing, Michigan*

- Collaborated with a research team on theoretical nuclear physics research.
- Conducted Bayesian analysis to quantify uncertainties in the empirical nuclear saturation point of symmetric matter.
- Evaluated the accuracy of recent microscopic calculations against the empirical point.
- Utilized Python to develop an algorithm for improved uncertainty quantification of the empirical saturation point.
- Wrote a manuscript that summarizes the scope of the project, the technical details behind the Bayesian framework, and the results.
- Presented findings at Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE).
- Presented findings at Alliances for Graduate Education and the Professoriate (AGEP).

Hunter College (RISE Program) **May 2021 – May 2023**
Research Intern *New York, New York*

- Assisted in graduate-level research on quantum computing.
- Explored the implications of Grover's algorithm through classical wave interpretation.
- Developed interference pattern equations remotely with Grover's algorithm iterations.
- Analyzed unambiguous discrimination in optical systems and implemented protocols in quantum cryptography.
- Presented findings from solving unambiguous discrimination for specific systems at CUNY Graduate Center.

Projects

Unambiguous discrimination on Bell States | *Python, Mathematica*

- Assisted in developing a script that allows one to find results for input Bell states.
- Gives all possible results of all the combinations of input states from applying a 10x10 Unitary on 4 input bell states.
- Assisted in developing an unambiguous discrimination algorithm that resolves the output bell states.
- Involves the use of libraries NumPY, SymPY and mostly relies on string and list manipulations.

Bayesian Analysis of the Empirical Nuclear Saturation Point | *Python*

- Developed an algorithm for sampling points from a posterior distribution from a multivariate Gaussian distribution of unknown mean and covariate matrix.
- Developed a Bayesian linear regression model of Chiral-Effective Field Theory predictions with a 95 % confidence interval.
- Involves the use of libraries NumPY, SymPY, Matplotlib and lays out the groundwork to sample from a Normal-Inverse Wishart distribution along with determining the mean/covariate matrix given some initial priors.

Technical Skills

Languages: Python, C++, Mathematica
Developer Tools: VS Code
Technologies/Frameworks: Linux, GitHub, Windows

Publications

Quantifying the empirical saturation point: a Bayesian approach **In Print**