Huan Q. Bui

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Education

B.A., Colby College ('21), Waterville, ME
Majors: Physics and Mathematics
Minor: Statistics
GPA: 4.15/4.00

Summer school, Perimeter Institute for Theoretical Physics, *June 2020*
Topics: Path Integrals, Quantum Information, Numerical Methods, Symmetries

Relevant Coursework: (*) denotes "Independent Study"
• **Physics:** quantum information, massive gravity*, classical field theory*, quantum mechanics, general relativity, classical mechanics, E&M, thermo & statmech
• **Mathematics:** algebraic geometry, abstract algebra, real analysis, complex analysis, ordinary differential equations, partial differential equations, matrix analysis, linear algebra, probability theory, vector calculus, honors calculus
• **Statistics:** mathematical statistics/statistical inference, statistical modeling, applied longitudinal data analysis

Research

Undergraduate Researcher, Perimeter Institute for Theoretical Physics, *May –Aug 2020*
• Area(s): Quantum information, Condensed matter physics
• Quantum many-body physics on quantum hardware
• Principal Investigator: Timothy Hsieh

Research Assistant, Colby College Dept. of Mathematics & Statistics, *Oct 2019–Present*
• Area(s): Applied mathematics, Mathematical physics
• Principal Investigator: Evan Randles
• Convolution powers of complex functions on $\mathbb{Z}^d$ whose attractors involve oscillatory integrals
Compute convolution powers & associated attractors that are highly oscillatory integrals
Generate examples indicative of a new local limit theorem
Prove a new local limit theorem (in preparation)

Research Assistant, Joint Quantum Institute, College Park, *Summer 2019, Jan 2020*
• Area(s): Experimental atomic physics
• Principal investigator: Steven Rolston
• Studying infinite-range interactions and finding evidence of superradiance and super-superradiance between two Rb ensembles trapped around an optical nanofiber via measuring their collective decay.

Research Assistant, Colby College Dept. of Physics & Astronomy, *Nov 2017–Present*
• Area(s): Experimental atomic physics
• Principal Investigator: Charles Conover
• Precision measurements on ultracold ^{39}K in Rydberg states, *2017-2019*
Lifetime measurements of ultracold $4p$ ^{39}K , *2019-*

Other Offers

Research Assistant, Institute for Quantum Computing, Waterloo, *May –Aug 2020*
(*declined to accept offer from Perimeter Institute*)

Summer School, Institute for Quantum Computing, Waterloo, *May 2020*
(*declined to accept offer from Perimeter Institute*)

Conferences/ Presentations

DAMOP 20, *May 2020*
Measurements of f-, g-, and h-state quantum defects in Rydberg states of potassium

CLAS (Colby Liberal Arts Symposium) 2020, *May 2020*
Massive Gravity (*canceled due to COVID-19*)

CLAS 2020, *May 2020*
Topics in Quantum Information (*canceled due to COVID-19*)

DAMOP 19, *May 2019*
Millimeter-wave precision spectroscopy of d-d transitions in ^{39}K Rydberg states

CLAS 2019, *May 2019*
Matrices in Quantum Computing: A 2-qubit entanglement circuit

CUSRR2018, *Jul 2018*
Precision measurement of potassium energy levels at highly excited states

Projects

Personal Website/Archive, `GitHub`, `huanqbui.com`, *Oct 2019 –Present*
Notes from class and independent readings plus other projects.

Experimental Physics, Advisor: Charles Conover
Lifetime measurements of ultracold potassium 4p, *Jan 2018 –Present*

Theoretical Physics, Advisor: Robert Bluhm, *Feb 2019 –Present*
Theoretical aspects of Massive Gravity

Applied Mathematics, Advisor: Evan Randles, *Sep 2019 –Present*
Convolution powers of complex functions & harmonic analysis

Awards/ Honors/ Fundings

Williams A. Rogers Prize in Physics and Astronomy, Colby College, *May 2020*

Phi Beta Kappa (US national academic honor society), *April 2020*

Mu Sigma Rho (US national statistics honor society), *April 2020*

Linda K. Cotter Internship Fund, *Jan 2020*
for Jan 2020 internship at the Joint Quantum Institute (JQI), College Park, MD

Phi Beta Kappa Scholastic Achievement Award, *Sep 2019*
The Phi Beta Kappa Scholastic Achievement Award was established by the Beta Chapter of Colby College in 1992 to recognize students from the sophomore and junior classes for exceptional scholastic performance.

Julius Seelye Bixler Scholar, *Sep 2018, Sep 2019*
Bixler Scholars are the top-ranking students as determined by the cumulative academic record at the end of the preceding year.

Meritorious Winner, COMAP Mathematical Contest in Modeling, *S'19*
Top 8% out of more than 10,000 teams

Dean's List, *F'17, S'18, F'18, S'19, F'19*

Teaching

Assistantship

Teaching Assistant, Colby College Dept. of Physics & Astronomy
- Current course: Modern Physics II (quantum)
- Instructor: Robert Bluhm
- Grade weekly problem sets
- Past courses: Modern Physics II (quantum; instructor: Robert Bluhm), Modern Physics I (relativity & early quantum; instructor: Duncan Tate), Introduction to Electricity-Magnetism & Optics (instructor: Charles Conover), Introduction to Mechanics (instructor: Jonathan McCoy)

Teaching Assistant, Colby College Dept. of Mathematics & Statistics
- Current course: Ordinary Differential Equations
- Instructor: Evan Randles
- Grade problem sets & hold weekly TA sessions
- Past courses: Linear Algebra (instructor: Otto Bretscher)

Mathematics & Physics Tutor, Colby College Deans of Studies
- Provide academic assistance through reviewing course material and solving problems

Skills

Physics research: massive gravity, general relativity, classical & quantum field theory, atomic physics, optics, precision atomic spectroscopy, Ramsey spectroscopy, fabricating & polarization control in optical nanofibers, magneto-optical & optical dipole trapping, constructing external-cavity diode lasers & frequency-stabilizing electronics, programming arbitrary waveform generators for fast-field switching, data acquisition & analysis

Mathematics research: numerical integration with Python & Mathematica of highly oscillatory integrals, computing convolution powers of complex-valued functions on $\mathbb{Z}^d$ with Python, general relativity in Mathematica (xACT, xPert)

Programming/Scripting Languages: R, Python, Mathematica, HTML & CSS, LaTeX

Softwares: IGOR Pro, NI-MAX, PicoHarp & TimeHarp (photon-counting modules), MS Office, Adobe Illustrator, Adobe Lightroom

Languages

English (fluent), Vietnamese (native),

Other Activities

Math Mentor, Colby Dept. of Mathematics & Statistics

Colby Society of Physics Students, Colby Photography Club, Colby Ultimate Frisbee, Classical guitar

References

Professor Robert Bluhm
Department of Physics & Astronomy
Colby College
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Professor Charles Conover
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Professor Evan Randles
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