

# Atharva Vidwans

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## EDUCATION

<b>University of Wisconsin Madison</b> PhD, Chemistry	<b>Aug '24 – Current</b>
<b>University of Wisconsin Madison</b> M.S. Physics-Quantum Computing	<b>Aug '22 – May '24</b>
<b>Savatribai Phule Pune University</b> Bachelor of Engineering, Mechanical Engineering	<b>July '15 – June '19</b>

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## PUBLICATIONS

- Atharva Vidwans**<sup>†</sup>, Jingcheng Dai<sup>†</sup>, John M. Hawthorne, Eric H. Wan and Micheline B Soley, 'Molecular resonance identification in complex absorbing potentials via integrated quantum computing and high-throughput computing', arXiv preprint arXiv:2511.15981, 2025
- Atharva Vidwans**<sup>†</sup>, Qilin Li<sup>†</sup>, Yazhen Wang and Micheline B. Soley, 'Harnessing Bayesian Statistics to Accelerate Iterative Quantum Amplitude Estimation', arXiv preprint arXiv:2507.23074, 2025.
- Vidwans, A. S.** (2021). Cognitive computing in autonomous vehicles. In Cognitive Computing for Human-Robot Interaction (pp. 121-146). Academic Press.

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## RESEARCH EXPERIENCE

- Research under Prof. Matthew Otten (University of Wisconsin Madison)** **July '25 – Current**  
**Non-orthogonal Quantum Eigensolver with Bayesian Quantum Iterative Quantum Amplitude Estimation (BIQAE) and estimating resources for FTQC**
- Working in Non-Orthogonal Quantum Estimation algorithm to improve the shots counts using BIQAE, reduce the number of Pauli terms of decomposition using double factorization and Tensor Hyper contraction and improve circuit depth.
  - Working on reducing the depth and T gate count of BIQAE circuit using techniques like local Grover implementation, surrogate quantum circuits and using different quantum compilers.
  - Working on resource estimation of BIQAE on FTQC using Fluid Allocation of surface code qubit mathematical model.
- Research under Prof. Micheline Soley (University of Wisconsin Madison)** **Jan '23 – June '25**  
**Quantum Deflated Resonance Identification Variational Eigensolver (qDRIVE) algorithm**
- Developed and deployed quantum algorithm interlaced with HTC called qDRIVE, on simulators and IBM quantum hardware, demonstrating skills in quantum algorithm design, optimization, and implementation of Complex Absorbing Potentials.
  - Used High throughput computing as a part of the pipeline for generating the initial state in qDRIVE.
- Bayesian Iterative Quantum Amplitude Estimation (BIQAE) algorithm** **May '23 – June '25**
- Improved existing Iterative Quantum Amplitude Estimation using Bayesian to estimate the energy of a state with much less counts compared to currently existing estimation techniques, demonstrating skills in quantum algorithm like Gover, IQAE and understanding of Bayesian techniques.
- Research under Prof. Shimon Kolkowitz (University of Wisconsin Madison)** **Feb '23 – May '23**  
**Simulating surface codes using Qiskit**
- Utilized Surface codes for generating single logical qubits implemented of X-cut and Z-cut qubits, as well as logical X, Y, Z, and H operations, achieving consistent fidelity and low error rates and explored the 'Braiding

transformation' to entangle two logical qubits and investigated various caveats related to Surface codes, including the impact of initialization and readout errors on stability.

**Research under Prof. Pawel Gora (University of Warsaw)**

**June '21 – May '22**

**Solving Vehicle Routing Problem using quantum computer**

- Implemented a customized version of the Variational Quantum Eigensolver (VQE) combining layered-VQE and filtering-VQE augmented with Conditional Value at Risk (CVaR) techniques tailored to achieve precise solutions for the Vehicle Routing Problem with Time Windows (VRPTW) on Quantum Computers in Qiskit.

**PRESENTATIONS AND CONFERENCES**

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'Quantum Deflated Resonance Identification Variational Eigensolver (qDRIVE) Algorithm for Molecular Resonances on Near-Term Quantum Computers' **Atharva Vidwans** and Jingcheng Dia. Presented by Atharva Vidwans at Chicago Quantum Summit 2024, US

'Quantum Deflated Resonance Identification Variational Eigensolver algorithm for Molecular Resonances on Near Term Quantum Computers', **Atharva Vidwans** and Jingcheng Dia. Presented by Atharva Vidwans at Graduate Student Faculty Liaison Committee (GSFLC), US **Aug '23**

'Solving Vehicle Routing Problem using Variational Quantum Eigensolver', **Atharva Vidwans** and Walid el Maouaki, Presented by Atharva Vidwans at 13th Warsaw IT days Conference, Poland **April '22**

**ACADEMIC SERVICE**

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Reviewer for Quantum Machine Intelligence (Springer) **June '23**

Teaching Assistant, General Chemistry CHEM 104 **Sept '25 – Current**

Teaching Assistant, Physical Chemistry 2 CHEM 562 **Jan '25 – May '25**

Teaching Assistant, General Chemistry CHEM 109 **Sept '24 – Dec '24**

**SKILLS**

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Python (NumPy, SciPy, OpenFermion, PySCF), Qiskit (Aer, Nature, Primitives), Docker, High Throughput Computing (HTC Condor), Complex Absorbing Potentials (CAPs), Resource estimation, Quantum algorithms.

**CERTIFICATIONS AND AWARDS**

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IBM Quantum Qiskit v0.2X Associate Developer Certificate **Jan '22**

Fourth Place in International IBM Quantum Qiskit 2021 Competition **June '21**

Fourth Place in National IBM Qiskit Challenge (India) **Sept '20**