Parth Bhargava

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EDUCATION

National University of Singapore *Aug 2024 – May 2028*

Bachelor of Science in Physics (Honors, Distinction) **GPA: 4.43**

COURSEWORK

Experimental Physics:
- Measured carrier mobility and type in semiconductors via Hall effect; cross-validated results through magnetoresistance analysis ($R^2 > 0.99$); identified intrinsic transition temperature
- Determined lattice constants via X-ray diffraction with sub-2% accuracy; applied structural fingerprinting to identify unknown crystal phases; validated Kramers theory for bremsstrahlung cutoff
- Calibrated Helmholtz field configuration; validated five independent scaling laws ($R^2 > 0.997$); quantified uncertainty in field constant to 3.3% through cross-method comparison
- Characterized electron spin resonance in paramagnetic systems; extracted g-factors and analyzed hyperfine interactions
- Analyzed laser light propagation through optical media; measured diffraction patterns and beam characteristics

Theoretical & Computational:
- Mechanics: Lagrangian and Hamiltonian formulations, coupled ODEs, variational principles
- Electromagnetism: Maxwell's equations, boundary-value problems, vector calculus
- Quantum Mechanics: Schrödinger equation, operator methods, eigenvalue problems
- Mathematical Methods: Linear algebra, ODEs/PDEs, Fourier analysis, complex analysis
- Computation: Python, Julia, C++; numerical methods, data analysis, visualization
- Experimental Methods: Statistical analysis, uncertainty propagation, calibration, regression

PROJECTS

Quantum Wavepacket Visualization *Jan 2025 – Mar 2025*

Developed interactive visualizations of quantum phenomena in Python
- 3D simulation of a quantum wavepacket traversing a potential barrier
- Quantum harmonic oscillator dynamics

ACHIEVEMENTS

- **BITSAT: 321/390**, strong proficiency in Physics, Chemistry, and Mathematics
- **JEE Mains: 99.14 percentile** (Top 1% of 2 million candidates)
- **JEE Advanced Rank: 9112**, exceptional problem-solving abilities
- Awarded **Silver Medal** in International Aerospace Olympiad 2024
- **IISER Aptitude Test Rank: 357**

INTERESTS

- **Computational Physics and Machine Learning:** Physics-informed neural networks, scientific computing, and data-driven approaches to modeling complex physical systems
- **Experimental and Theoretical Integration:** Laboratory techniques in condensed matter physics, instrumentation development, and bridging experimental data with computational models