

# Month 5 - 7 | Linear algebra , QM and Python

2026-01-05 – 2026-04-02

## 1: Weekly Learning

- Course study:
  - MITOCV 18.06 Linear Algebra by Professor Strang
  - MITOCV 8.04 Quantum Physics I
- Finish 18.009 Differential equation and 128A Numerical Analysis
- Learn Matlab

## 2: Weekly Highlights

- Developed the ability to represent differential equations using matrix formulations and solve linear systems via eigen decomposition
- Developed an initial understanding of QM, de Broglie matter waves, Schrödinger equation, Hermitian operators, SHO and 1D behavior
- Gained working familiarity with numpy, sympy, and scipy for numerical and symbolic computation
- Implemented a Python-based simulation of the 1D harmonic oscillator, visualizing wavefunctions and probability distributions, and exploring normalization and orthogonality numerically

## 3: Insights & Takeaways

- Realized that quantum mechanics replaces deterministic trajectories with probability distributions derived from wavefunctions, fundamentally changing how physical systems are described.
- Noticing that many quantum systems can be restated as eigenvalue problems, thus deeply integrating physical behavior with mathematics, has provided me with a new perspective on viewing problems.

## 4: Challenges & Open Questions

- Quantum mechanics requires further study. At present, there is a large amount of discrete knowledge, which needs to be further studied to form a knowledge structure.
- The current main difficulty lies in establishing an intuitive connection between Dirac notation and wavefunctions, which requires reinforcing understanding through more concrete examples.

## 5: Following Plan

- Continue studying of Linear Algebra and Quantum Physics I
- Start to learn Quantum Physics II