Reading assignment - PHYS 344 - Autumn 2025

Preliminary background material (week 1)

Our Quantum course does not require any prior studies of Physics. However, we do suggest reading selected chapters from the very popular Feynman Lectures on Physics, in order to familiarise yourself with the basic notions of classical physics. You would get some context for the quantum phenomena considered in our Quantum course. You may also find it useful to skim through the material and then come back later to some chapters as the course progresses.

Mechanics

- Feynman vol 1, Chapter 4 "*Conservation of Energy*" https://www.feynmanlectures.caltech.edu/I_04.html
- Feynman vol 1, Chapter 9 "*Newton's Laws of Dynamics*" https://www.feynmanlectures.caltech.edu/I_09.html
- Feynman vol 1, Chapter 21 "*The Harmonic Oscillator*" https://www.feynmanlectures.caltech.edu/I_21.html
- Feynman vol 1, Chapter 23 *"Resonance"* https://www.feynmanlectures.caltech.edu/I_23.html

Radiation

- Feynman vol 1, Chapter 28 *"Electromagnetic Radiation"* https://www.feynmanlectures.caltech.edu/I_28.html
- Feynman vol 1, Chapter 29 *"Interference"* https://www.feynmanlectures.caltech.edu/I_29.html
- Feynman vol 1, Chapter 32 "*Radiation damping*" https://www.feynmanlectures.caltech.edu/I_32.html

[Note: Feel free to skip the math and just capture the basic notions]

Statistical mechanics

- Feynman vol 1, Chapter 6 *"Probability"* https://www.feynmanlectures.caltech.edu/I_06.html
- Feynman vol 1, Chapter 41 "*The Brownian Motion*" https://www.feynmanlectures.caltech.edu/I_41.html

Introduction to introduction to quantum mechanics

(week 2-3)

- Feynman vol 3, Chapter 1 "*Quantum Behavior*" https://www.feynmanlectures.caltech.edu/III_01.html
- Susskind & Friedman, "**Quantum Mechanics: The Theoretical Minimum**" Chapter 1

free pdf copy available in Moodle
the book is available online at a low cost:
https://www.galaxus.ch/en/s12/product/quantum-mechanics-the-theoretical-minimum-leonard-susskind-english-non-fiction-13124696
also, see free lectures on youtube
https://theoreticalminimum.com/courses/quantum-mechanics/2012/winter/lecture-1
https://theoreticalminimum.com/courses/quantum-mechanics/2012/winter/lecture-2

The language of quantum mechanics (week 4-5)

Linear algebra

- Susskind & Friedman, "**Quantum Mechanics: The Theoretical Minimum**" Chapters 2-3
- Kay, Laflamme, Mosca "**An Introduction to quantum computing**", Chapters 2

available at EPFL library https://academic.oup.com/book/41807
free pdf copy available in Moodle

Qubits and the quantum rules of the game

- Susskind & Friedman, "**Quantum Mechanics: The Theoretical Minimum**" Chapters 4-7
- Kay, Laflamme, Mosca "**An Introduction to quantum computing**", Chapter 3

Quantum harmonic oscillator

There is lots of material on this topic, but it is generally not easy to follow.
We propose that you study the lecture note that comes with the HW2 and follow the corresponding Python exercises/demonstrations