Introductory Physics III – Thermal and Modern Physics

Naman Mishra

August 2023

Contents

Lecture 01: Introduction

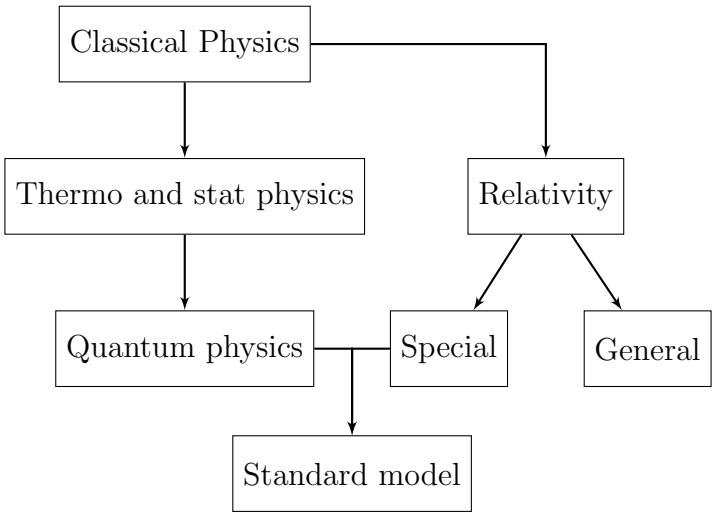
Fri 04 Aug '23

1 The Course

1.1 Schedule

- MWF 12:00-13:00 lecture hours (no tutorial on Monday)
- Tutorials will still be held occasionally with homework discussions and quizzes.

1.2 Syllabus



1.3 Grading

- **Quizzes:** 20%.
- **Midterm:** 40%.
- **Final:** 40%.

2 Classical Physics

2.1 Newton's Laws

(I) In an inertial frame, $\boldsymbol{F}_{\text{net}} = 0 \implies \boldsymbol{v} = \text{const}$.

(II) $\ddot{\boldsymbol{r}} = \frac{\boldsymbol{F}_{\text{net}}}{m}$ where m is the inertial mass.

(III) For any 2 particles, $\boldsymbol{F}_{12} = -\boldsymbol{F}_{21}$.

2.1.1 Math: Vector Equations

$$\ddot{\boldsymbol{r}} = \frac{\boldsymbol{F}}{m} \equiv \begin{cases} \ddot{x} = \frac{F_x}{m} \\ \ddot{y} = \frac{F_y}{m} \\ \ddot{z} = \frac{F_z}{m} \end{cases}$$

For a system of N particles, we have $3N$ equations of motion. With $6N$ initial conditions, the evolution of the system is uniquely determined.

2.2 Conservation Laws

2.2.1 Momentum

2.2.2 Energy

2.2.3 Angular Momentum