

# Quantum Mechanics

## Physics 237

Frank L. H. Wolfs  
Department of Physics and Astronomy  
University of Rochester

Frank L. H. Wolfs      Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 1

1

---

---

---

---

---

---

---

---

# Online Comments

- Due to the decision by the U of R leadership team to require online instructions in January, there will be Zoom connections for lectures, recitations, and office hours. Details will be announced via email.
- The Zoom connections will require you to have a Zoom account.
- Note: zoom links for other course components will be distributed via email later this week.

Frank L. H. Wolfs      Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 2

2

---

---

---

---

---

---

---

---

# Physics 237

- What to expect?
  - This will be low-tech on-the-board course.
  - All course materials will be available on the web.
- Course components and time table.
  - The time table is my best guess of what can be covered during this semester.
  - The first 9 chapters are critical and sufficient time will be allocated to an in-depth discussion of that material; these chapters are critical for Physics 246.
- Today's topics:
  - The birth of quantum mechanics.
  - How black-body radiations leads to energy quantization.

Frank L. H. Wolfs      Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 3

3

---

---

---

---

---

---

---

---

Warning: some think my Phy 237 exams are toxic. Continue at your own risk!



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 4

4

---

---

---

---

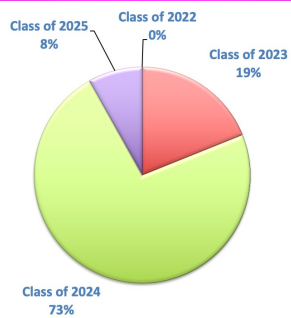
---

---

---

---

### Who are you? Class Distribution



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 5

5

---

---

---

---

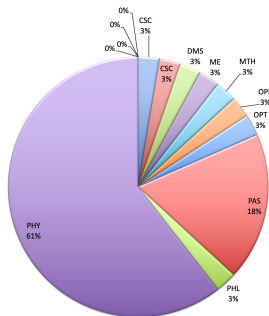
---

---

---

---

### Who are you? Major Distribution.



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 6

6

---

---

---

---

---

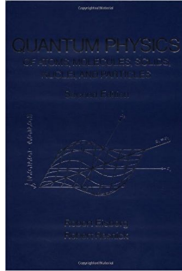
---

---

---

## Course Textbook

- *Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles* by Eisberg and Resnick.



Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 7

7

---

---

---

---

---

---

---

## Course Components

- **Lectures:**
  - TR: 12.30 pm – 1.45 pm.
- **Recitations:**
  - Start on Monday January 24.
- **Office hours:**
  - Start next week.
- **Homework assignments:**
  - Due on Fridays at noon.
  - On many assignments, there is one optional extra credit problem.
- **Midterm exams:**
  - Thursday February 10, Tuesday March 22, and Tuesday April 19 during the common exam time (8.00 am – 9.30 am) in B&L 109.
- **Final exam:**
  - TBD.

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 8

8

---

---

---

---

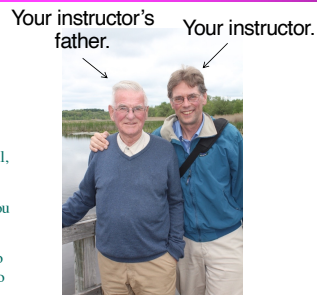
---

---

---

## Course Components.

- I am here to help you learn this material, but it is up to you to actually master it:
  - If there is something you do not understand you need to ask for help ..... (come and talk, email, ask after class, etc.)
  - It is my job to teach you ..... you are paying my salary .....
  - In lecture courses it is difficult to see who needs help. You need to ask for the help you need before you fall behind.



Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 9

9

---

---

---

---

---

---

---

Course Components.  
A warning.

So Very Dutch

Dutch directness

The Dutch are renowned for speaking their minds: from complete strangers reprimanding you for chatting in the train's quiet zone, to a friend not telling you a white lie about your bad haircut. Outsiders often see this as being rude or tactless, but for the Dutch it is actually a virtue of sincerity and honesty. They don't mince their words or beat around the bush, and are often not afraid to discuss hot topics such as religion, politics, immigration or money. In fact, it is even seen as a cultural faux pas to not have an opinion. Some studies

trace this directness back to the country's history of Calvinism: Calvinists are concerned with the essence of things and what is really important. The good thing about this 'callous' openness? At least you know exactly where you stand with the Dutch.

From KLM  
Holland Herald

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 10

10

---

---

---

---

---

---

---

---

Resources

- The following resources are available:
  - Recitations, starting January 24: ask question, discuss solutions of previous homework assignment, practice additional problems, ....
  - Office hours, starting January 19:
    - Instructor: Wednesdays 9 am – 11 am, zoom TBD, after 2/1: B&L 203A.
    - Navya Uberoi, Wednesdays 1 - 3 pm, zoom TBD, after 2/1: POA.
    - Elizabeth Champion, Thursdays 2 - 4 pm, zoom TBD, after 2/1: B&L 304.
    - Margaret Porcelli, Thursdays 5 - 7 pm, zoom TBD after 2/1: POA.
  - Course Webpage:
    - <http://teacher.pas.rochester.edu/PHY237/Phy237HomePage.shtml>

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 11

11

---

---

---

---

---

---

---

---

Grade Calculation and Course Grade.  
Absolute standards: no grading in a curve.

	Exam 1	Exam 2	Exam 3	Final	Homework
1	15%	15%	15%	30%	25%
2	---	20%	20%	35%	25%
3	20%	---	20%	35%	25%
4	20%	20%	---	35%	25%

score < 30% :	F	55% ≤ score < 60% :	C+
30% ≤ score < 35% :	D-	60% ≤ score < 65% :	B-
35% ≤ score < 40% :	D	65% ≤ score < 70% :	B
40% ≤ score < 45% :	D+	70% ≤ score < 75% :	B+
45% ≤ score < 50% :	C-	75% ≤ score < 80% :	A-
50% ≤ score < 55% :	C	80% ≤ score :	A

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 12

12

---

---

---

---

---

---

---

---

## Academic Honesty.

- Violations of the academic honesty policy are not tolerated. Violations include, copying homework assignments from other students, using on-line version of the "Instructor Solutions Manual" or other published solutions to the homework problems.
- Consequences of violations of the academic honesty policy:
  - Using illegal source to complete a homework assignment will result in a one-letter grade lowering of your course grade on the first offense. A second offense will result in an E as your final course grade.
  - Violations of the academic honesty policy during any of the midterm exams or the final exam (including bringing your cell phone to the exam) will result in an E as your final course grade.
- You need to sign the academic honesty pledge in order to be able to continue with Phy 237.

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 13

13

## Academic Honesty.

- Note: the online solutions frequently skip steps, allowing us to easily recognize submissions that are copied.
- In Fall 2021, 20% of the class received a lower grade due to violations of the academic honesty policy.
- Please sign the contract today and return it online (using the dropbox link provided).

Physics 237 Academic Honesty Contract

I, \_\_\_\_\_, understand that I am signing this contract as a condition of my enrollment in Physics 237. I agree to abide by the University of Rochester Academic Honesty Policy, which can be found at: <https://www.urochester.edu/honesty/>

I have read the contract and understand its contents. I agree to the terms of the contract and will abide by its provisions. I understand that any violation of the contract will result in a one-letter grade lowering of my course grade on the first offense. A second offense will result in an E as my final course grade.

I understand that any violation of the contract during any of the midterm exams or the final exam (including bringing my cell phone to the exam) will result in an E as my final course grade.

I understand that I need to sign this contract in order to be able to continue with Physics 237.

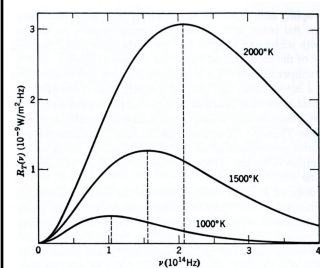
Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 14

14

Figure 1.1



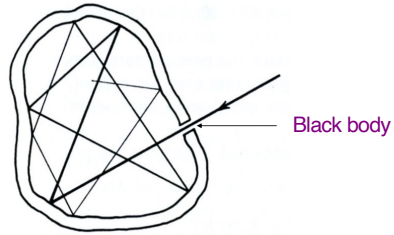
Observe:  
Increase in temperature  
increases energy emitted  
and shifts spectrum to  
higher frequencies.

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 15

15

Figure 1.2



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 16

16

---

---

---

---

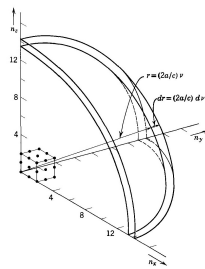
---

---

---

---

Figure 1.5



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 17

17

---

---

---

---

---

---

---

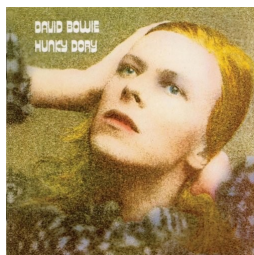
---



3 Minute 56 Second Intermission.

- Since paying attention for 1 hour and 15 minutes is hard when the topic is physics, let's take a 3 minute 56 second intermission.

- You can:
  - Stretch out.
  - Talk to your neighbors.
  - Ask me a quick question.
  - Enjoy the fantastic music.



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 18

18

---

---

---

---

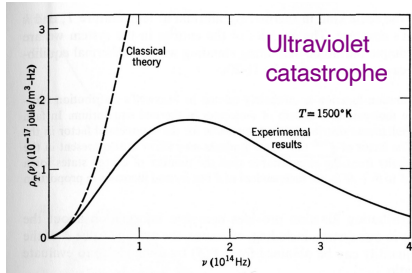
---

---

---

---

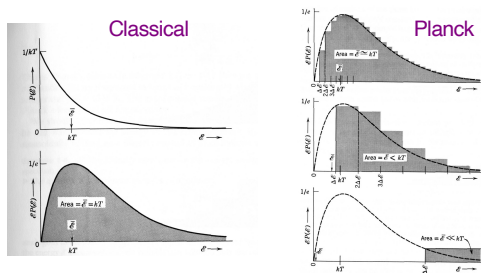
Figure 1.8



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 19

19

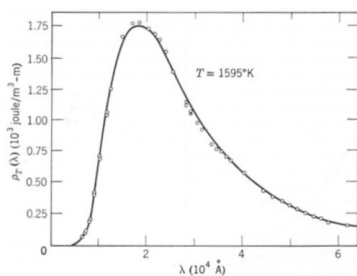
Figure 1.9 + 1.10



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 20

20

Figure 1.11



Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 21

21

ENOUGH FOR TODAY?

Frank L. H. Wolfs

Department of Physics and Astronomy, University of Rochester, Lecture 1, Page 22

---

---

---

---

---

---

---