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# Quantum Mechanics

## Physics 237

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# Online Comments

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- 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.

# Physics 237

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- 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.

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

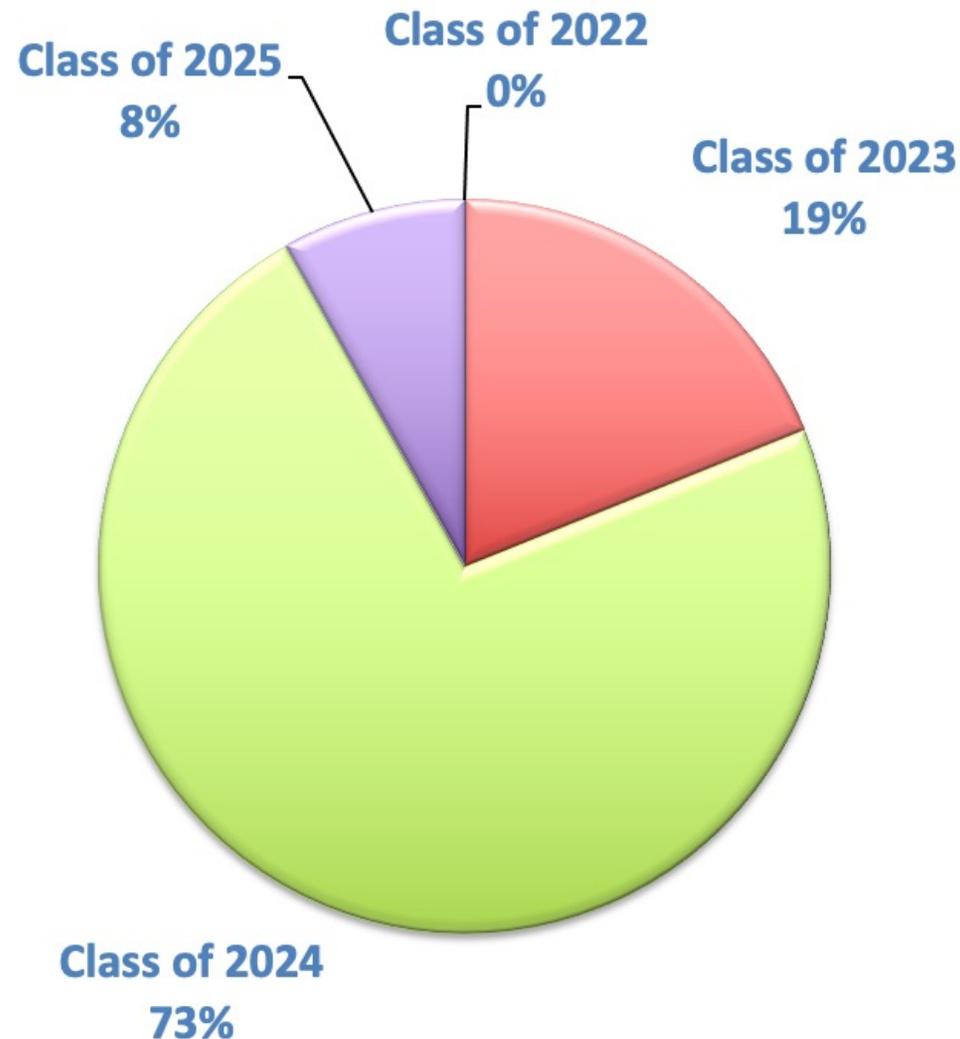
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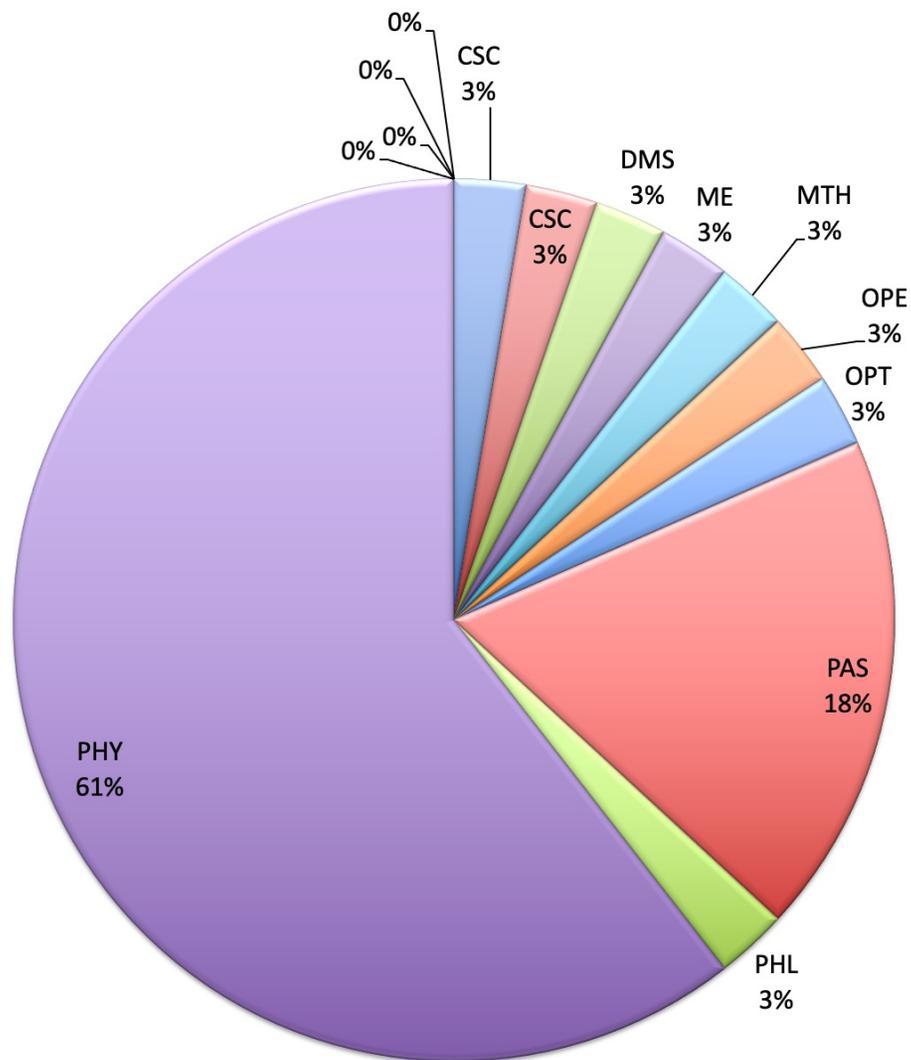
# Who are you?

## Class Distribution

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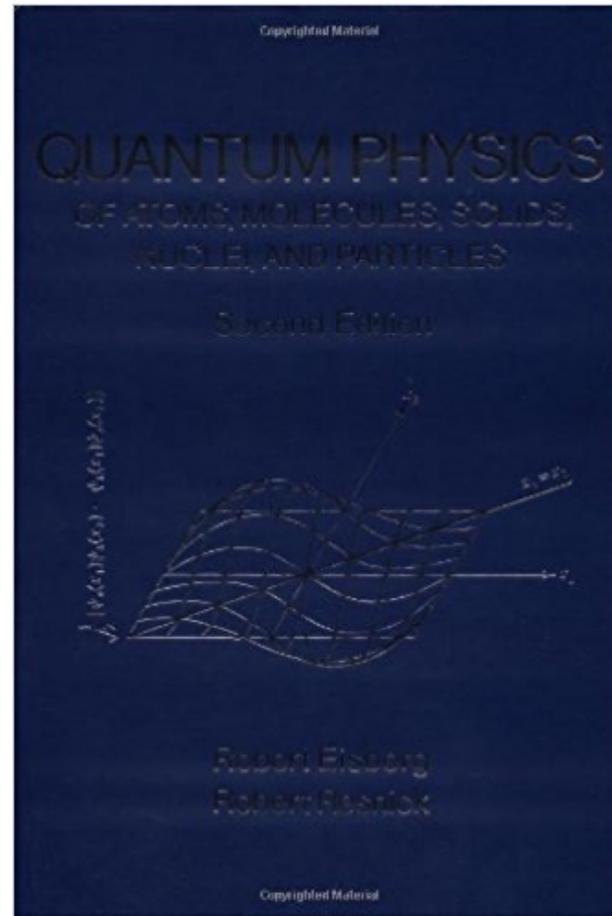


# Who are you? Major Distribution.



# Course Textbook

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



# Course Components

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- 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.

# 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.

Your instructor's  
father.

Your instructor.



# 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**

# Resources

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- 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>

# 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

# Academic Honesty.

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- 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.

# 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

By signing this contract, I indicate that I agree to the University of Rochester Academic Honesty Policy, which can be found on the internet at the following URL:

<https://www.rochester.edu/college/honesty/policy.html>

I understand, that signing this contract is a requirement for me to be allowed to take Physics 237.

I agree that I will not copy homework assignments from other students and/or use unauthorized resources to solve these assignments. Unauthorized resources include the instructor solutions manual and published solutions to specific problems. On the cover of each assignment, I will write the following:

**Honor Pledge for Graded Assignments**  
"I affirm that I have not given or received any unauthorized help on this assignment, and that this work is my own."

\_\_\_\_\_  
\_\_\_\_\_  
Signature \_\_\_\_\_

**If the honor pledge is missing on a specific assignment, I accept that I will lose 20% of the maximum number of points.**

I agree that I will not copy solutions to exam problems from the students that are seated around me. I agree that I will not bring my cell phone to any of the Phy 237 exams and use other unauthorized tools on my exams. On the cover of each exam, I will write the following:

**Honor Pledge for Exams**  
"I affirm that I will not give or receive any unauthorized help on this exam, and that all work will be my own."

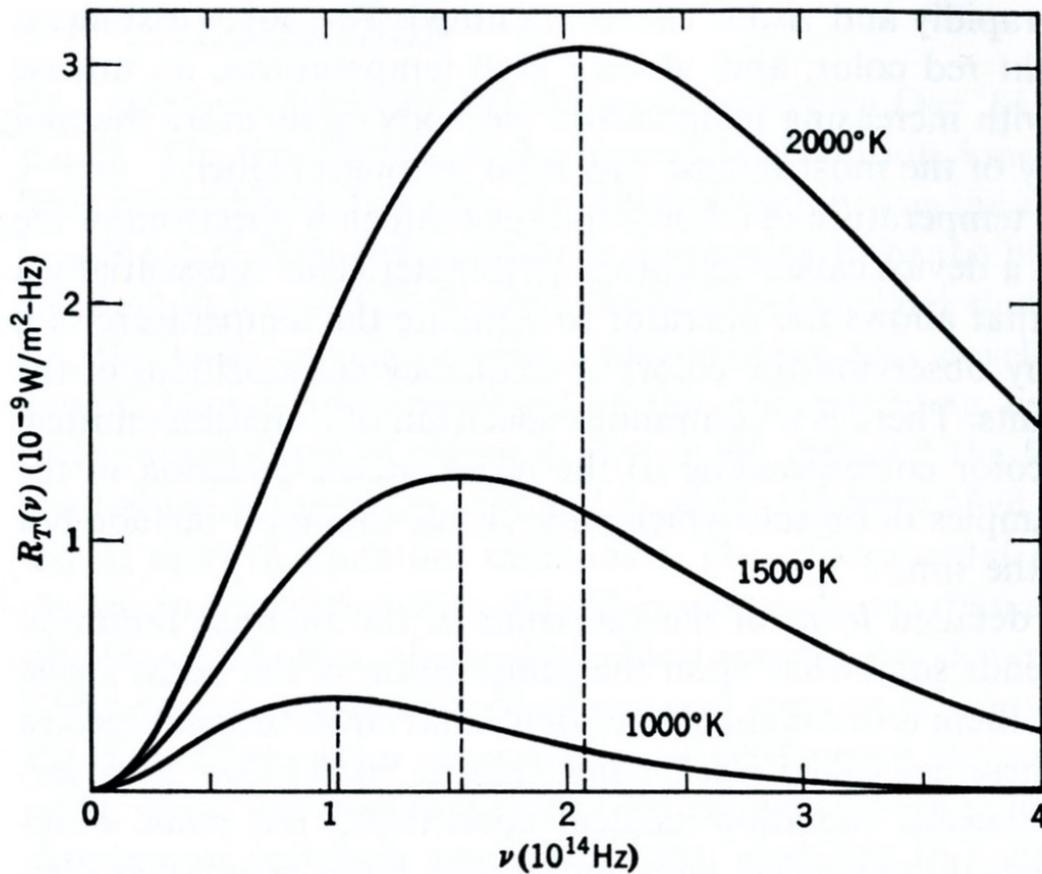
\_\_\_\_\_  
\_\_\_\_\_  
Signature \_\_\_\_\_

**If the honor pledge is missing on an exam, I accept that I will lose 20% of the maximum number of points.**

Name: \_\_\_\_\_

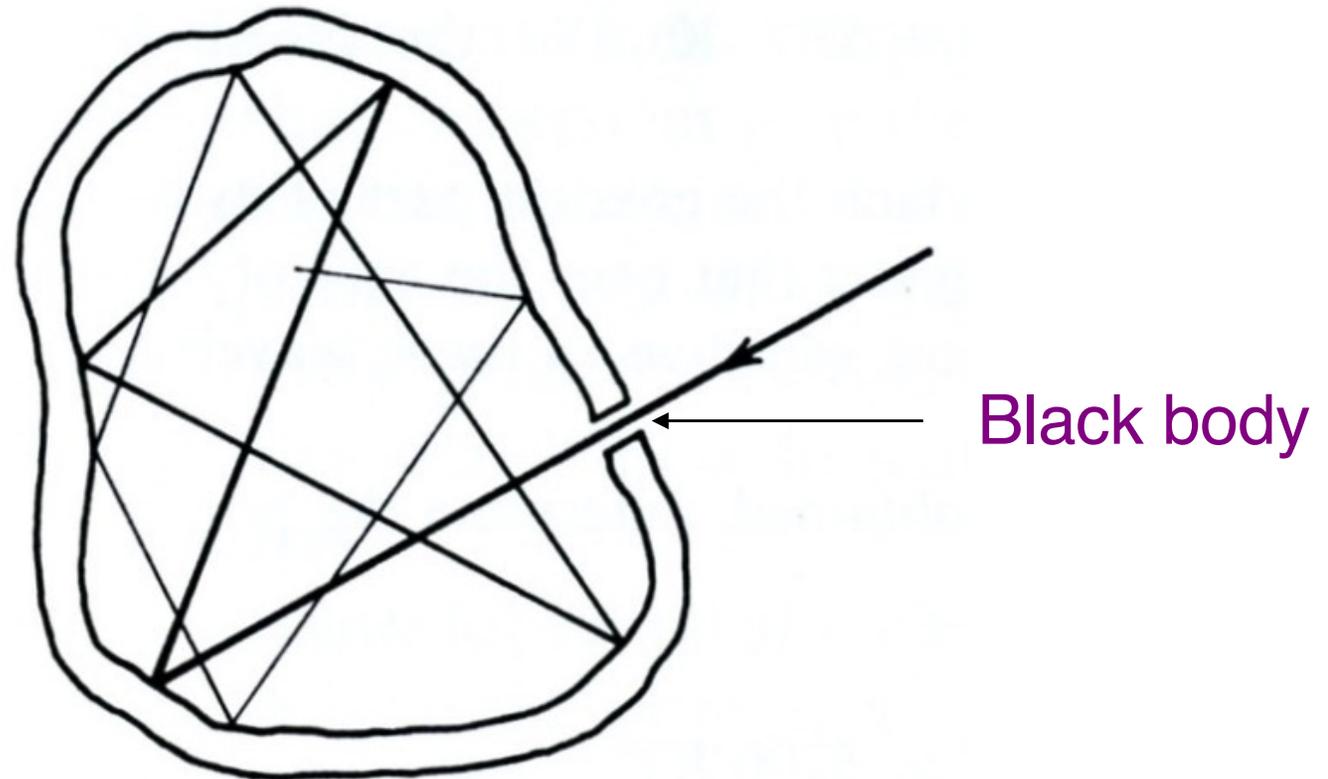
Signature: \_\_\_\_\_ Date: \_\_\_\_\_

# Figure 1.1

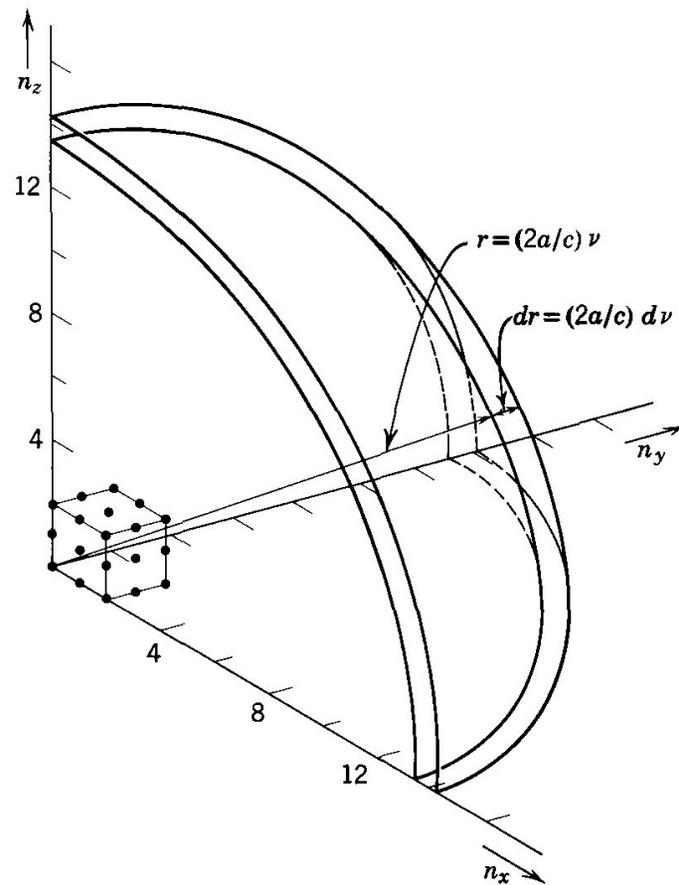


Observe:  
Increase in temperature  
increases energy emitted  
and shifts spectrum to  
higher frequencies.

## Figure 1.2



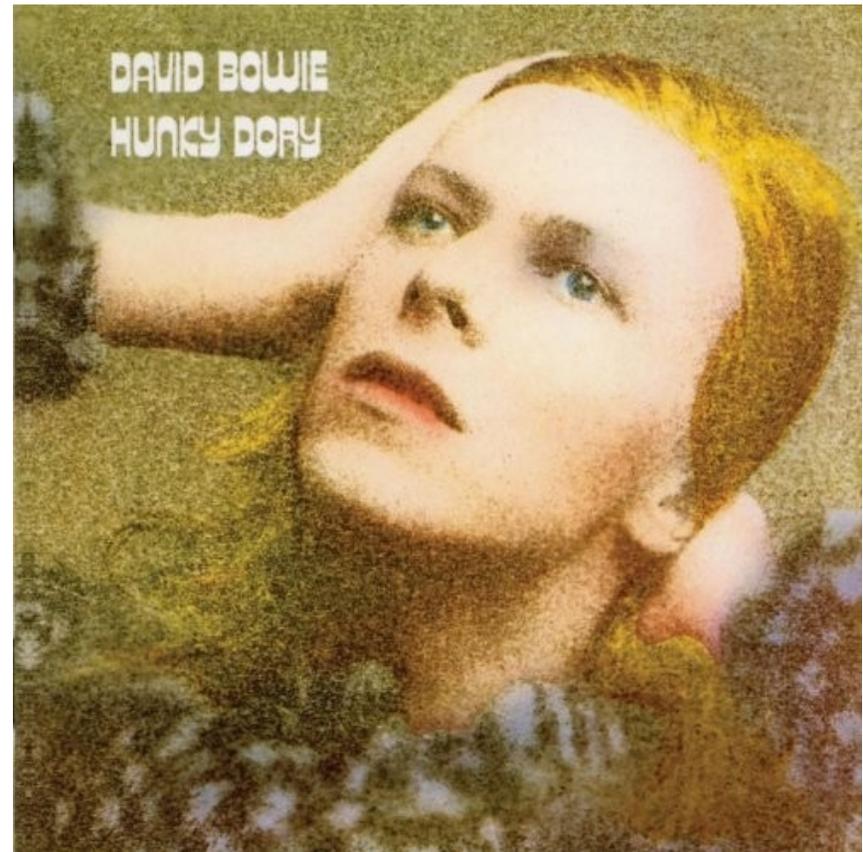
# Figure 1.5



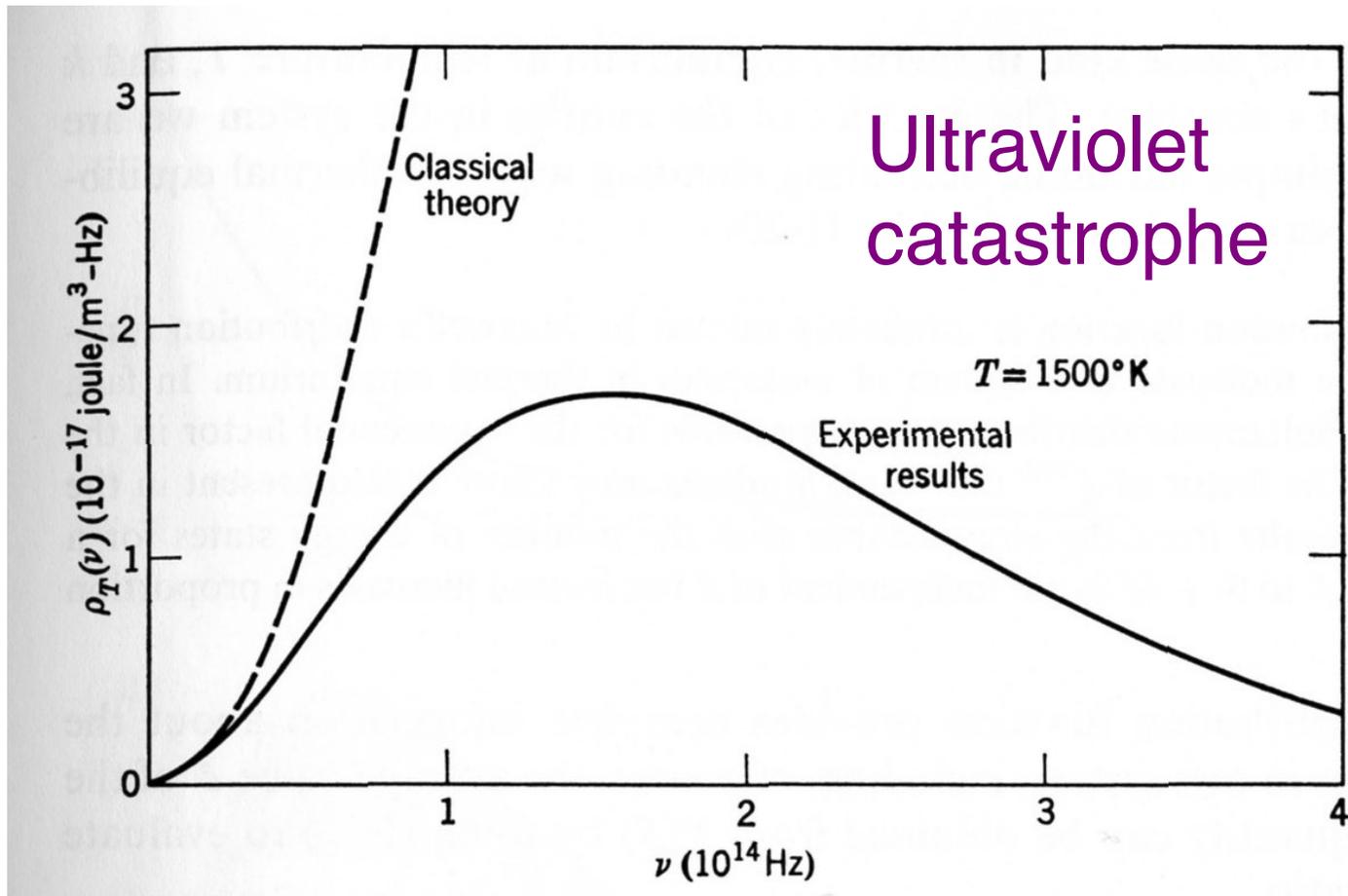


## 3 Minute 56 Second Intermission.

- 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.

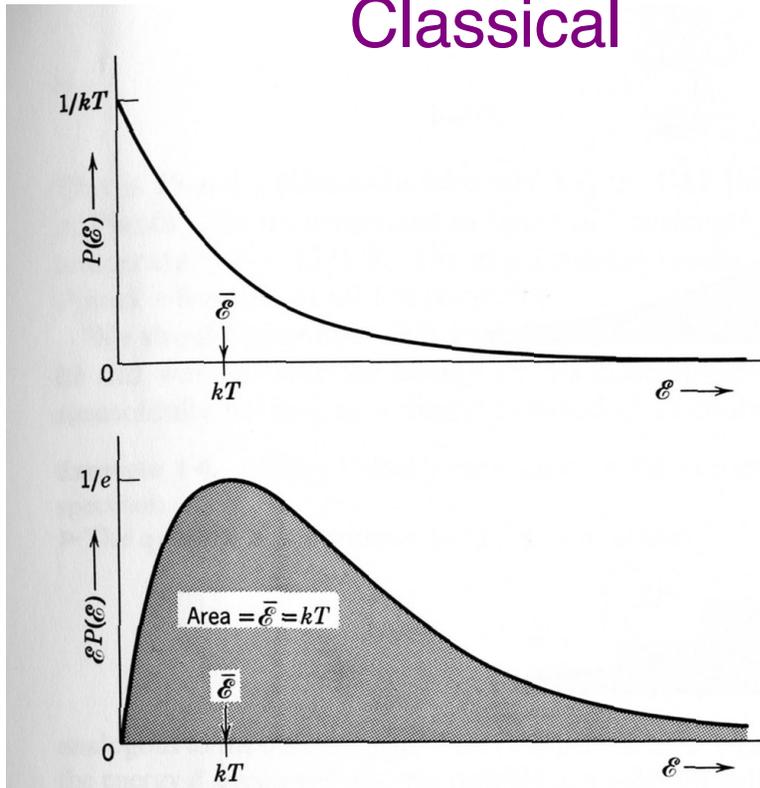


# Figure 1.8

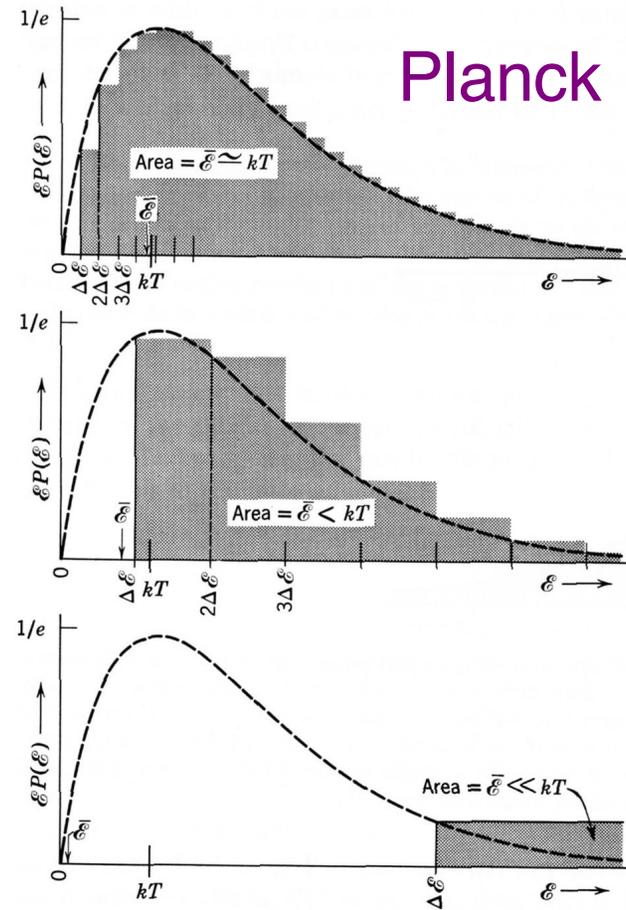


# Figure 1.9 + 1.10

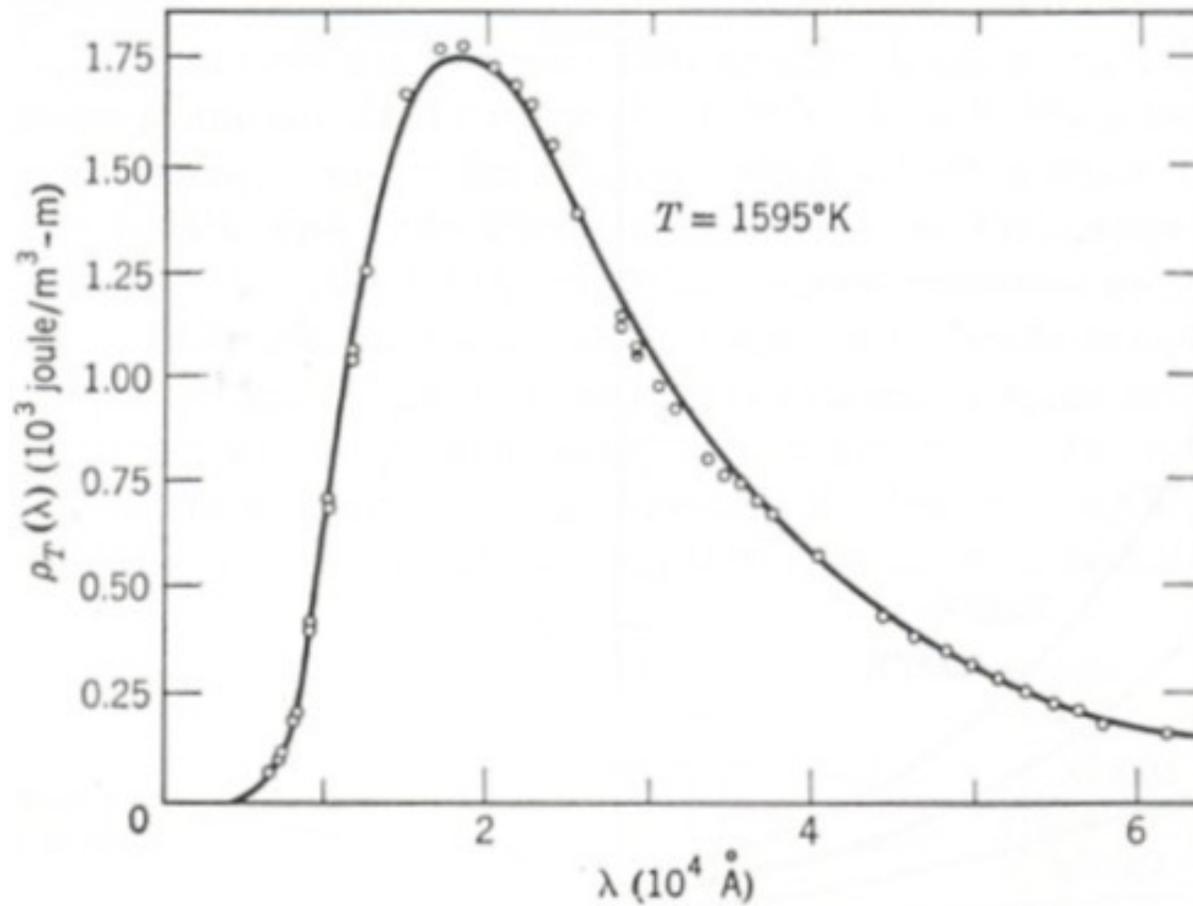
Classical



Planck



# Figure 1.11



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# ENOUGH FOR TODAY?