



 Physics 141. Lecture 24.

 • Course Information.

 • Continue our discussion of Chapter 13:

 • Equation of state.

 • The energy distribution of an ideal gas and energy exchange with its environment.

 • Engines and heat pumps.

 • Efficiency

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Physics 141. Course information.

- Homework 10 is due on Friday December 6 at noon.
- Homework set 11 is due on Friday December 13 at noon.
- To calculate the final homework grade, I remove the lowest homework grade and then take the average of the remaining 10 homework grades. If you are happy with homework grades 1 10, you can consider homework 11 as optional.

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Physics 141. Course information.

• You will receive Exam 3 back during recitations this week.

- \bullet If you are unhappy with the grading of Exam 3, please return your blue booklet(s) to me with a note describing why you feel you deserve more points by the end of class on 12/5.
- The final exam will take place on Monday 12/16 at 4 pm in Hoyt. The exam will take 3 hours and cover all the material discussed in Phy 141, except the error analysis.
- There will be normal office hours on Wednesday and Thursday next week to answer any questions related to the final exam.
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Analysis of experiment # 5. Updated Timeline.

- √11/14: collisions in the May room • ✓ 11/18: analysis files available.
- //www.pas.rochester.edu/~tdimino/phv141/lab05/ • √ 11/25: each student has determined his/her best estimate of the velocities before and after
- the collisions. • \checkmark 11/25: complete discussion and comparison
- of results with colliding partners and submit final results (velocities and errors).
- ✓ 11/27: results will be compiled, linear momenta and kinetic energies will be
- determined, and results will be distributed. ✓ 12/2: office hours by lab TA/TIs to help with
- analysis and conclusions.

12/6: students submit lab report # 5. Frank L. H. Wolfs Department of Physics and Astronomy, University of Rochester, Lecture 24, Page

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Adiabatic processes
$$(Q = 0 \text{ J})$$
.
• Integrating each term in the previous expression shows that
 $\frac{C_V}{k} \ln T + \ln V = \ln T \frac{C_V}{k} + \ln V = \ln V T \frac{C_V}{k} = \text{constant}$
or
 $VT \frac{C_V}{k} = (TV \frac{k}{CV})^{\frac{C_V}{k}} = \text{constant}$
• This expression can also be written in terms of the pressure
and volume (which is of course what we need to defined the
curve in the pressure versus volume graph):
 $TV \frac{k}{CV} = (\frac{pV}{Nk}) V \frac{k}{CV} = \frac{pV \frac{C_V + k}{Nk}}{Nk} = \frac{pVY}{Nk} = \text{constant}$
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Physics 141. Do you violate the second law?

- During the past 4 months, your brain hopefully has absorbed much of what I have covered, and concepts associated with mechanics should be in a much more ordered state in your brain on December 16 compared to their order on August 27.
- Did you violate the second law by going from disorder to order?
- Not if you include the disorder you dumped into your environment due to sweating over the exams and homework assignments. If you include that disorder, this course has a resulted in a greater disorder in our Universe (since the impact of Physics 141 is clearly irreversible). rank L. H. Wots Department of Physics and Astronomy, University of Bochester, Lecture 24, Page 36





