

## PHY132S – Introduction to Physics II

- I am David Harrison
- I will be coordinating today's introduction to PHY132
- I will also be doing Classes 1 – 8 and 22 – 26
- More about me soon



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## Today

- Structure of PHY132
  - It is a lot like PHY131
- People
  - There are many familiar faces
- Content: what are we going to learn about this term?
- Begin the first section: **Waves**

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## Structure

- Classes
  - MW 11 – Convocation Hall
  - MW 5 – MP102

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## Structure

- Classes
- Pre-Class Quizzes
  - Almost every week
  - Count for 2% of the total course mark
  - Due by 10 AM Mondays
  - Delivered with *MasteringPhysics*
  - **Pre-Class Quiz 1 due next Monday January 12**
  - It is on Chapter 21

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### Structure

- Classes
- Pre-Class Quizzes
- MasteringPhysics Homework
  - Almost every week
  - Count for 6% of the total course mark
  - Due by 11:59 PM Fridays
  - **MP Homework #1 due this Friday January 9**
  - It is on Chapter 20

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### Structure

- Classes
- Pre-Class Quizzes
- MasteringPhysics Homework
- Written Homework
  - Two Written Homework assignments this term
  - Count for 5% of the total course mark


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### Structure

- Classes
- Pre-Class Quizzes
- MasteringPhysics Homework
- Written Homework
- Clickers
  - Almost every class
  - 1% for participation
  - 1% for correct answers

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### Structure

- Classes
- Pre-Class Quizzes
- MasteringPhysics Homework
- Written Homework
- Clickers
- Practicals 
  - Combine tutorials and labs
  - Count for 15% of the total course mark
  - 2 hours every week
  - Begin Wednesday January 14
  - More details soon

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## Structure

- Classes
- Pre-Class Quizzes
- MasteringPhysics Homework
- Written Homework
- Clickers
- Practicals
- Test
  - Tuesday February 24, 6 – 7:30 PM
  - Counts for 30% of the total course mark

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## Structure

- Classes
- Pre-Class Quizzes
- MasteringPhysics Homework
- Written Homework
- Clickers
- Practicals
- Test
- Final Exam
  - 2 hours
  - Day/time TBA
  - 40% of the total course mark

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## About *MasteringPhysics* & Clickers

- The same account you used for PHY131F will be used for PHY132S
  - You need to register for **MPPHY132S09**
  - Please use your student number
- You do not need to re-register your clickers

## The Course web page

- <https://portal.utoronto.ca>

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## People

- Course Coordinator: Dr Pierre Savaria
- Course Administrator: Ms April Seeley
- Classes 1- 8 and 22-26: Dr David Harrison
- Classes 9 – 21: Prof Kimberly Strong
- Practicals: Drs Vatche Deyirmenjian & Jason Harlow

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## People

- Course Coordinator: Dr Pierre Savaria
  - Same as PHY131F
  - Office: MP129E
  - Phone: 416 978 4135
  - Office Hours: TBA
  - Email: [phy132@physics.utoronto.ca](mailto:phy132@physics.utoronto.ca)



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## People

- Course Administrator: Ms April Seeley
  - Same as PHY131F
    - She is the person who makes the course actually work
  - Office: MP129

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## People

- Classes 1- 8 and 22-26: Dr David Harrison
  - Office: MP129B
  - Phone: 416 978 2977
  - Office Hours:
    - Tuesday 10 – 11AM
    - Friday 2 – 3 PM
  - You have a “hunting license”: You are welcome to drop by any time. Either we can talk then or set up an appointment
  - Email: [david.harrison@utoronto.ca](mailto:david.harrison@utoronto.ca)



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## People

- Course Coordinator: Dr Pierre Savaria
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## PHY132 – Electromagnetism Section

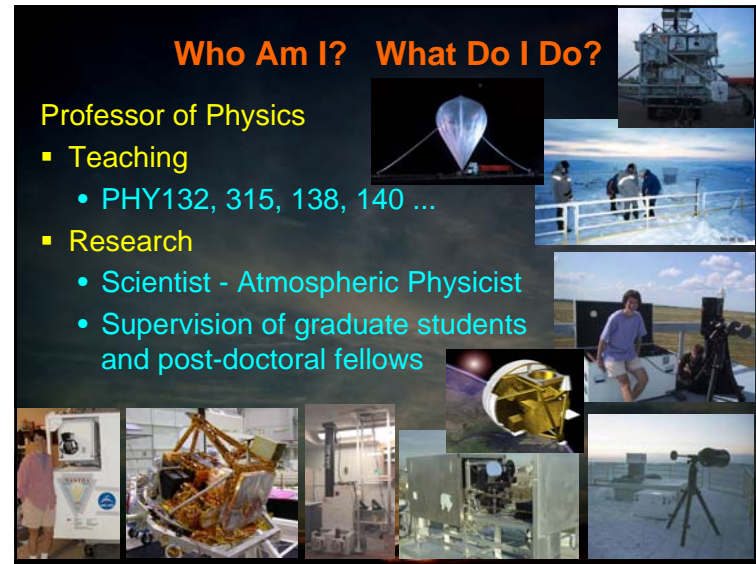
- Classes 9-21: *Prof. Kimberly Strong*
- Office: MP710A
- Telephone: (416) 946-3217
- Email: [strong@atmosp.physics.utoronto.ca](mailto:strong@atmosp.physics.utoronto.ca)
- Tentative office hours:
  - Wednesdays 2-3
  - Fridays 3-4
  - or by appointment (and with “hunting licence”),



## Who Am I? What Do I Do?

Professor of Physics

- Teaching
  - PHY132, 315, 138, 140 ...
- Research
  - Scientist - Atmospheric Physicist
  - Supervision of graduate students and post-doctoral fellows



## How Did I Become a Scientist?

- B.Sc., Memorial University of Newfoundland
- D.Phil., Atmospheric Physics, Oxford
- Post-doctoral fellow, Cambridge & York U



## People

- Practicals: Dr. Vatche Deyirmenjian
  - Lectured in PHY131F last term
  - Office: MP129B
  - Phone: 416 946 0336
  - Office Hours: TBA
  - Email: [dey@physics.utoronto.ca](mailto:dey@physics.utoronto.ca)



## People

- Practicals: Dr. Jason Harlow
  - Coordinated the PHY131F Lab last term
  - Office: MP129A
  - Phone: 416 946 4071
  - Office Hours: TBA
  - Email: [jharlow@physics.utoronto.ca](mailto:jharlow@physics.utoronto.ca)



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## Content

- Waves (Chapters 20 – 23)
  - The next stage in the journey we began in PHY131
  - Waves are everywhere: water waves, sound waves, vibrating guitar strings, light waves, the swaying ground of an earthquake, and more
  - Goal: to learn about a single elegant theory that describes them all

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## Content

- Waves (Chapters 20 – 23)
- Electricity & Magnetism (Chapters 26 – 33)

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## Electromagnetism Section

- 13 lectures: February 2 to March 23, 2009
- Home page for the EM section
  - a link will be added to the PHY132 course page
  - **stay tuned for content**

<http://www.atmosp.physics.utoronto.ca/people/strong/phy132/phy132.html>

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## Electromagnetism Syllabus

(parts of) Chapters 26 to 33, excluding 28

- Electric Forces and Electric Fields
- Electric Potential Energy
- The Electric Potential
- Equipotentials and Energy in Capacitors
- Currents, Resistance, and Resistivity
- Circuits and Kirchoff's Laws
- Magnetic Fields and Magnetic Force

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## Tentative Schedule for EM – 1/3

- L9 (Feb 2): Intro, Electric Charge, Insulators, Conductors, Polarization [Ch 26]
- L10 (Feb 4): Electric Dipole, Coulomb's Law, Permittivity, Electric Field Model, Electric Field of a Point Charge [Ch 26]
- L11 (Feb 9): Electric Field Models, Electric Field of a Dipole, Electric Field Lines [Ch 27]
- L12 (Feb 11): Parallel Plate Capacitor, Electric Potential Energy [Ch 27]

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## Tentative Schedule for EM – 2/3

- **February 16-20 Reading Week**
- L13 (Feb 23): Review for Mid-Term Test – Waves, Optics, and EM
- **Evening of Tuesday Feb 24: Mid-Term Test**
- L14 (Feb 25): Electric Potential [Ch 29]
- L15 (March 2): Connecting Potential and Field, Capacitance and Capacitors [Ch 30]
- L16 (March 4): Current, Batteries, Resistivity, Conductivity, Potential and Current [Ch 31]

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## Tentative Schedule for EM – 3/3

- L17 (March 9): Ohm's Law, Circuit Diagrams, Kirchoff's Junction and Loop Laws [Ch 31,32]
- L18 (March 11): Energy and Power, Series and Parallel Resistors, RC Circuits [Ch 32]
- L19 (March 16): Magnetism, Magnetic Field of Moving Charges, Biot-Savart Law [Ch 33]
- L20 (March 18): Magnetic Field of a Current, Dipoles, Solenoids, Lorentz Force [Ch 33]
- L21 (March 23): Review of E&M

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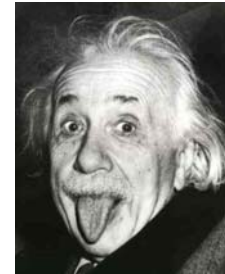
Enjoy your first month of PHY132!

See you on February 2

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## Content

- Waves (Chapters 20 – 23)
- Electricity & Magnetism (Chapters 26 – 33)
- The Special Theory of Relativity (Chapter 37)
  - The nature of space, time, simultaneity, etc. will turn out to violate our *common sense*
  - Einstein: “Common sense is the collection of prejudices acquired by age eighteen.”



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## Waves

- Reading Assignment for this week:
  - Review §14.1 - §14.4 on Simple Harmonic Motion
  - Chapter 20
- Suggested Chapter 20 Exercises and Problems for Practice: 7, 21, 31, 37, 64, 67, 77, 81 (**77 is funny!**)
- Reading Assignment for next week: Chapter 21

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## “Catching a Wave”



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### One Classification of Waves

1. "Mechanical" – travel in a medium. Examples: sounds waves, water waves
2. "Electromagnetic" – will be discussed in the Electricity & Magnetism and the Relativity sections of the course
3. "Matter Waves" – the wave aspect of 'particles' like electrons. Will not be discussed in PHY132S

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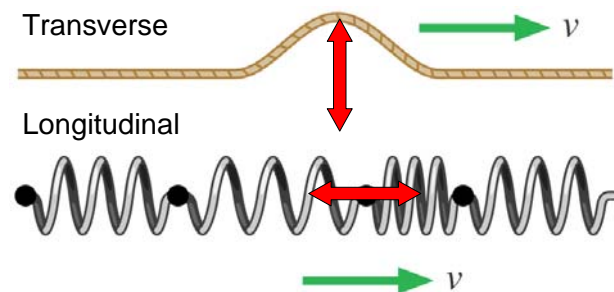
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### For all Mechanical Waves:

The wave travels *through* the medium

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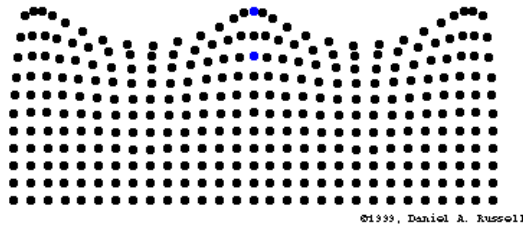
### Another Classification of Waves



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### For water waves, things are not so simple



- Near the surface, particles move in circles
- Further down, particles move in ellipses
- Deeper still, particles move back and forth (longitudinal)

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### About the Clicker Frequency

- In both Convocation Hall and in MP102, we will use the default frequency of **A A**
  - In PHY131F, classes in MP102 had to use a different frequency
- If you have not changed the frequency of your clicker, you do not have to do anything
- To change to the default frequency:
  - Press and Hold the Power Light until the power light flashes
  - Click **A A** (click A twice)

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### When we did the “wave” in class:

Was the wave disturbance **longitudinal** or **transverse**?

- A. Transverse
- B. Longitudinal
- C. None of the above

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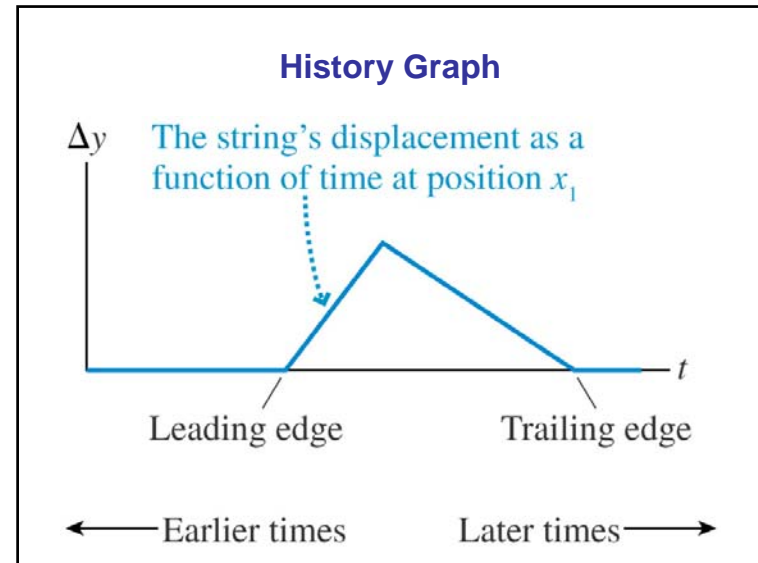
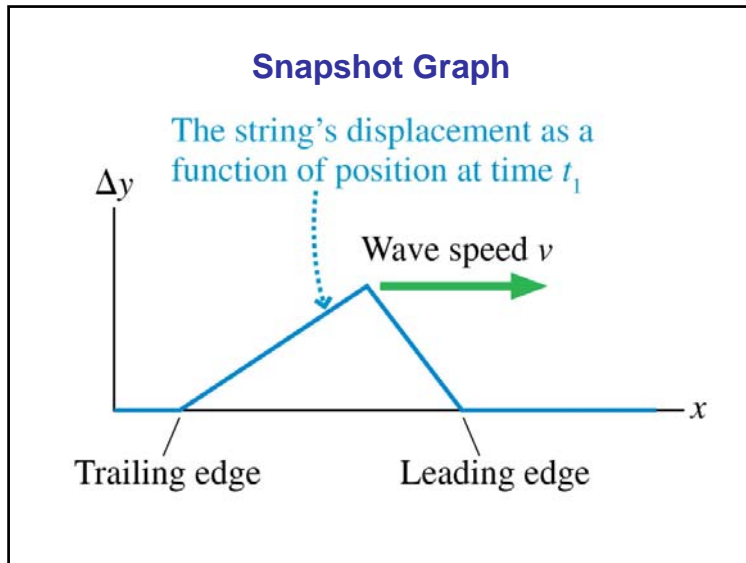
### You pursue a sound wave at 99% of the speed of sound relative to the air

You will observe:

- A. A sound wave moving away from you at the speed of sound
- B. A sound wave moving away from you at about 1% of the speed of sound
- C. A stationary sound wave
- D. You can not pursue a sound wave at 99% of the speed of sound

When we discuss the Special Theory of Relativity we will find out why I used the word ‘about’

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A string of beads are connected by a set of tiny springs. At the instant the clock starts ( $t=0$ ), a pulse is moving to the right on the beads and the snapshot graph looks like this:

Which of these history graphs tracks the position for the bead marked with a red arrow as a function of time?

A

B

C

D

