

Announcements

1. Exam on Wednesday
2. Covers:
 - Special & General Relativity
 - Cosmology
 - Demos in class, HW assignments, reading
3. Labs cancelled this week... Concentrate on exam !

Exam 2 Overview

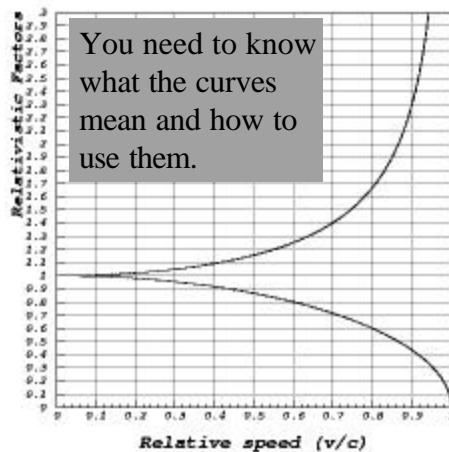
- Format will be similar to Exam 1 and last year's Exam 2
- Please, please, please, read the questions carefully.
- When asked to explain, please do so (clearly).
- More conceptual than Exam#1.
- A few (1 or more) of the problems may be exactly a duplicate from HW or last years Exam or the Relativity problem set.
- Format
 - Multiple Choice: 4 questions; some T/F. some fill in the blank
 - 9 Relativity, 7 Cosmology questions
 - Can drop 2 of the 16 questions !

Points

1. Attack the problems which you are most confident with first, then come back to the ones you are less sure of.
2. For the multiple choice problems, read each choice carefully, and choose the best answer.
3. If you think you need a formula or a constant, and you don't see it, ask a proctor.. It can't hurt to ask.
4. If you finish the exam early, read through it again and check for obvious mistakes. Make sure you're happy with your explanations.

What you will be given

+ Formulas & constants



	$0.1c$	$0.25c$	$0.5c$	$0.75c$	$0.9c$	$0.99c$
$0.1c$	$0.198c$	$0.341c$	$0.571c$	$0.791c$	$0.917c$	$0.992c$
$0.25c$	$0.341c$	$0.470c$	$0.667c$	$0.842c$	$0.939c$	$0.994c$
$0.5c$	$0.571c$	$0.667c$	$0.80c$	$0.909c$	$0.966c$	$0.997c$
$0.75c$	$0.791c$	$0.842c$	$0.909c$	$0.96c$	$0.985c$	$0.9986c$
$0.9c$	$0.917c$	$0.939c$	$0.966c$	$0.985c$	$0.994c$	$0.9995c$
$0.99c$	$0.992c$	$0.994c$	$0.997c$	$0.9986c$	$0.9995c$	$0.99995c$
c	c	c	c	c	c	c

Special Relativity

- ❑ Postulates of Special Relativity
 - constancy of speed of light, tests of
 - c being upper bound on any information transfer
- ❑ Time Dilation
 - problems, tests of, effects on aging
- ❑ Length Contraction
 - along vs perpendicular to direction of motion
- ❑ Velocity Addition
 - how do velocities add in S.R.
- ❑ Rest mass & $E = mc^2$
 - relativistic mass increase
 - conversion of mass into energy → doing work with it

General Relativity

- ❑ Principle of General Relativity
- ❑ Predictions of General Relativity
 - mass (and in general energy) warps space space
 - Black holes should exist
 - Gravitational waves (what are they, what do they do when they pass through matter?)
- ❑ Tests of General Relativity
 - Gravitational Lensing
 - Pound-Rebka Experiment
 - “Observation of black holes” (how are they “observed”?)
 - LIGO (using light interference to detect grav. Waves)
 - precession of Mercury’s orbit

Cosmology

Big Bang Model and 3 Pillars of support

Measuring stellar (galactic) positions (absolute vs apparent brightness, parallax); speeds, emission vs absorption vs continuous spectra.
Doppler Effect. Standard candles.

Expansion of Space, Hubble Constant, what is it? Relationship to the age of the Universe.

Cosmic Microwave Background (CMB). What is it? Temp. of the Universe by measuring CMB spectrum.

Big Bang Nucleosynthesis

Dark Matter, what is it, what evidence is there for it..

Dark Energy...

Tips

Understand the content/concepts in the lecture slides very well.
There was very little HW; the exam is strongly based on concepts presented in the slides

Understand what tests are done for confirming which hypotheses of Relativity and Cosmology.

Good luck !!!

Like Exam#1, I aim to make the exam thorough and fair.

There shouldn't be any surprises if you've been to class and have been keeping up with the work...



Question and
Answer Session