

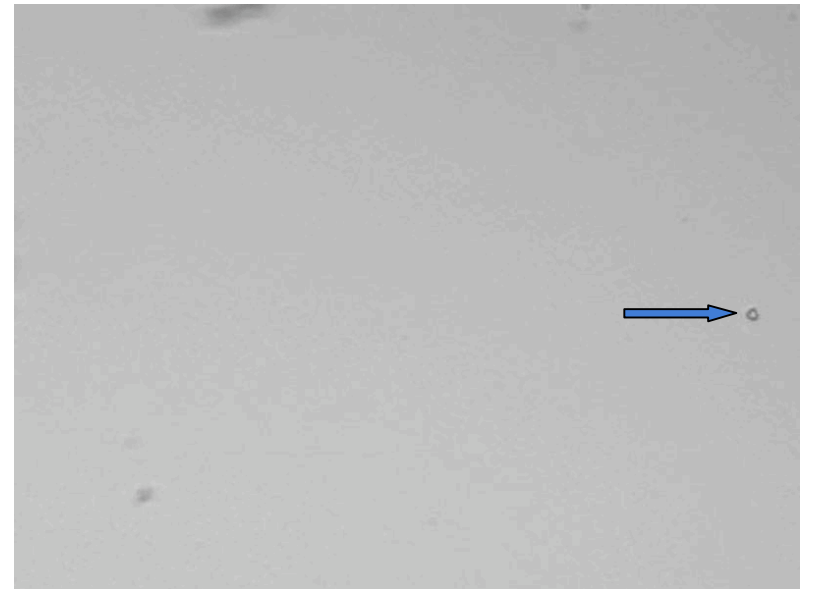
10/25/06

Exam grades, key posted

Extra Credit back Friday.

News? Two satellites (STEREO) launched to study Sun, space weather. NASA meets tomorrow to decide whether to fix Hubble.

Pic of the day - aerogel from Stardust Mission, dark spot may be first direct collection of an interstellar grain.



One Minute Exam

Which statement is most relevant to making an X-ray pulsar?

- A) A solitary neutron star rotates with a tilted magnetic field.
- B) A neutron star with an unstable accretion disk accretes matter from a binary companion.
- C) A neutron star with a tilted magnetic field accretes matter from a binary companion.
- D) A neutron star has a magnetic field 100 times stronger than the pulsar in the Crab nebula.

New Topic: Black Holes

Chapter 9

What do you know about them -- What did you learn?

Black Holes

Mitchell, Laplace, late 18th Century: with Newton's Gravity
could have escape velocity greater than the speed of light =>
light could not get out, completely dark, *corps obscurs*.

Now know Newton was wrong.

Excellent approximation for weak gravity - "true" in that case

Conceptual problems $F = \frac{G M_1 M_2}{r^2}$

infinite force for zero separation (in physics infinity
=> problem)

instantaneous reaction => infinite speed of gravity

Experiment - wrong deflection of light.

Need Einstein and more!

Great conceptual differences between Newton and Einstein on the Nature of Gravity

Newton - Force between two objects

Einstein - Mass curves space, objects move *with no force* in curved space

Need to explore curved space - use geometry in multiple dimensions

SPACE - *The Final Frontier*

Dimensions - defined by the number of mutually perpendicular directions

0 D - point

1 D - line

2 D - area

3 D - volume (secret hand sign)

4 D - ?

Hyperspace - space with more dimensions than the one under consideration