

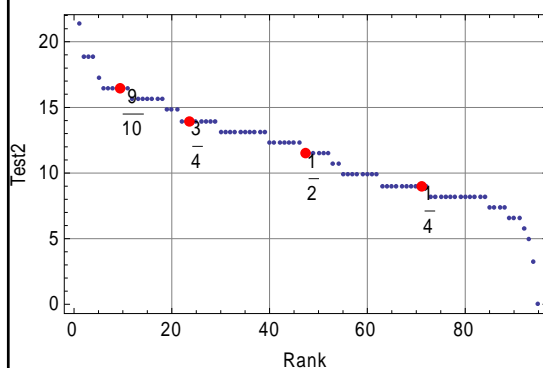
## Hubble's Law; Test 2–27 Oct

- Test 2
  - Answers
  - Lessons
- Intro: What are galaxies?
- Friday is start of Hubble's Law and Big Bang. Essential class
- No pre-class questions for Fri.
- Astronomical Horizons
  - Thurs, October 28, 7:30, Abrams Planetarium
  - Mars Meteorites: Rock Messengers from the Red Planet
  - Prof. Michael Velbel

10/27/2010

AST 210, Fall 2010

Test 2: Average: 11.5 (50%)  
 Test 1: Average: 75%



Ast 207 F2010

- Answers: Link T2 on syllabus on angel
- Grade is on angel
  - Report>Report Setting
  - Choose “Grades”
  - Overall % (Course grade)
    - Eg., 90% (4.0)
- Course grade
  - Test 1 is weighted 17% and Test 2 46% to make tests count same as all tests at end of course.
  - Average is 3.0
- 50% of grade is in the future.

## Test 2, Q1

- Lost without knowing
  - What is an H-R diagram?
  - Where are dwarfs & giants on H-R diagram?
- Main ideas
  - How are dwarfs in an old and new cluster different?
  - Hot-plate model.  
 $L = R^2 T^4$  What are the two physical parameters that determine location on H-R diagram?
  - Conversion between luminosity & magnitude.

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## Test 2, Q2

- Background
  - Hot plate model  
 $L = R^2 T^4$
  - Flux depends on distance.
  - Walter Adams' discovery of a white dwarf.
- Clues
  - Temperature same.
  - Star B is 15 mag fainter than star A.
- Questions
  - Do Walter & Balter have the same information? If so, then I can reason as Walter did. If not, I cannot reproduce the same arguments.

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## Test 2, Q3

- Main ideas
  - Kepler's Laws
  - Newton's realization.
  - K's 3<sup>rd</sup> Law as amended by Newton.

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## Test 2, Q4

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Main ideas           <ul style="list-style-type: none"> <li>– Parallax. Angle of a star changes over the year. Conversely, what motions are not due to parallax?</li> <li>– Angle=Baseline/Distance</li> </ul> </li> <li>• Learn from doing homework           <ul style="list-style-type: none"> <li>– Do the problem.</li> <li>– Afterwards               <ul style="list-style-type: none"> <li>• Recapitulate how you did it.</li> <li>• What did you learn?</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Bad practices           <ul style="list-style-type: none"> <li>– If it looks sort of like a duck, it must be a duck.</li> <li>– Find a formula with some of the same symbols.</li> <li>– Find an example and use the same numbers.</li> <li>– Balter is the same as Walter.</li> </ul> </li> <li>• Good practices           <ul style="list-style-type: none"> <li>– What is the main idea? Write it in your own words.</li> </ul> </li> </ul> |
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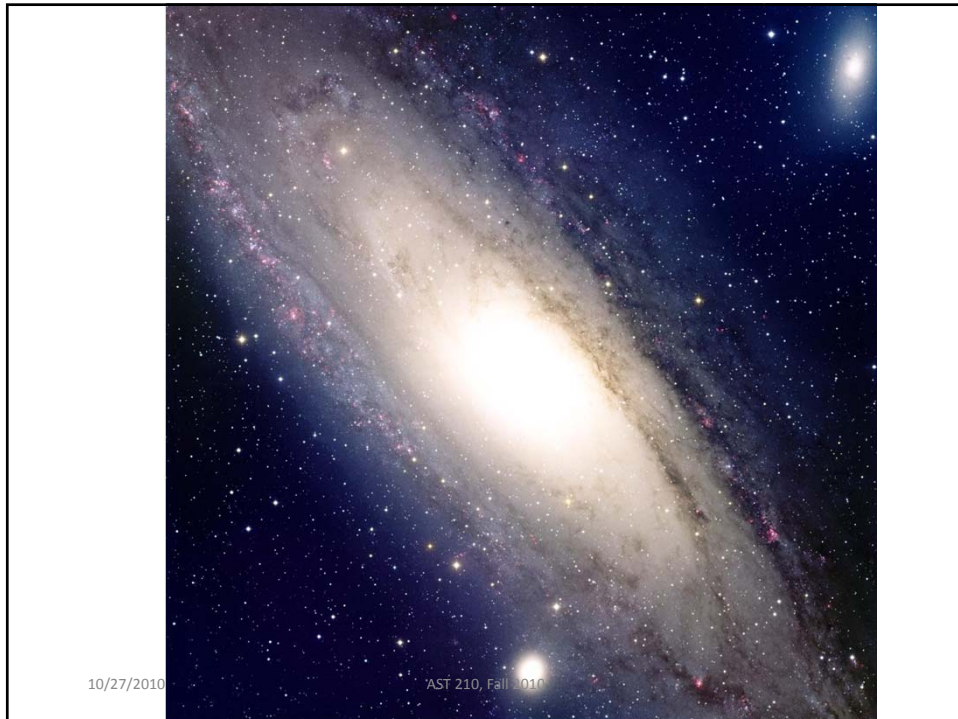
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## Realm of the nebulae (galaxies)

- Galaxies are made of billions of stars, gas, dust, and dark matter.
- Our galaxy is the Milky Way.
- Nearest big galaxy is our big sister Andromeda, which is 0.7Mpc from us. Sun is 8kpc from center of the Milky Way.

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Sombrero Galaxy • M104

# Sombrero




Hubble Heritage

NASA and The Hubble Heritage Team (AURA/STScI) • Hubble Space Telescope ACS • STScI-PRC03-28

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The image shows the Sombrero Galaxy (M104), a barred spiral galaxy with a prominent dark dust lane. The galaxy is oriented edge-on, giving it a flat, disc-like appearance. The central region is bright and contains a bar of stars. The surrounding area is filled with stars and some nebulae. The image is presented in a black frame with white text.

# M51



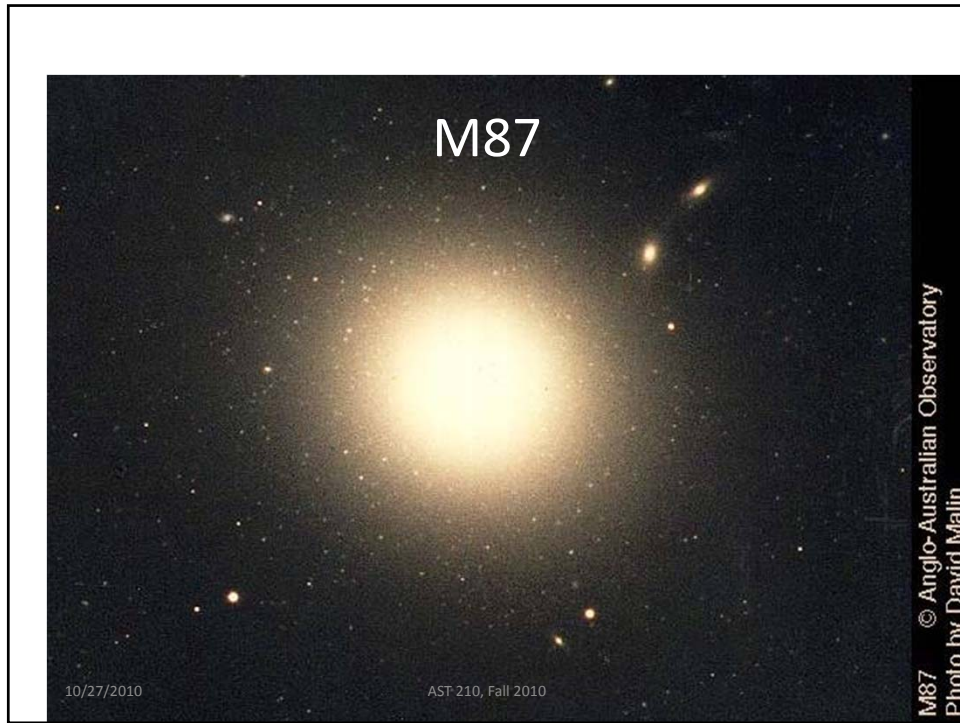
Hubble Heritage

Whirlpool Galaxy • M51

NASA and The Hubble Heritage Team (STScI/AURA)  
Hubble Space Telescope WFPC2 • STScI-PRC01-07

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The image shows the Whirlpool Galaxy (M51), a face-on spiral galaxy with two prominent spiral arms. The galaxy is oriented face-on, showing the intricate structure of the spiral arms. The central region is bright and contains a bar of stars. The surrounding area is filled with stars and some nebulae. The image is presented in a black frame with white text.



1. Which is bigger, galaxy or star cluster? Galaxy or solar system?

- A. Galaxy. Solar system.
- B. Star cluster. Solar system
- C. Star cluster. Galaxy.
- D. Galaxy. Galaxy.

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