

Announcements

- All assignments need to be turned in by Monday, April 27th
 - Unless it is a lab you are making up on Tuesday 28th and/or Wednesday 29th
 - As a reminder - the makeup labs are for ones you missed and **you must inform me in advance**

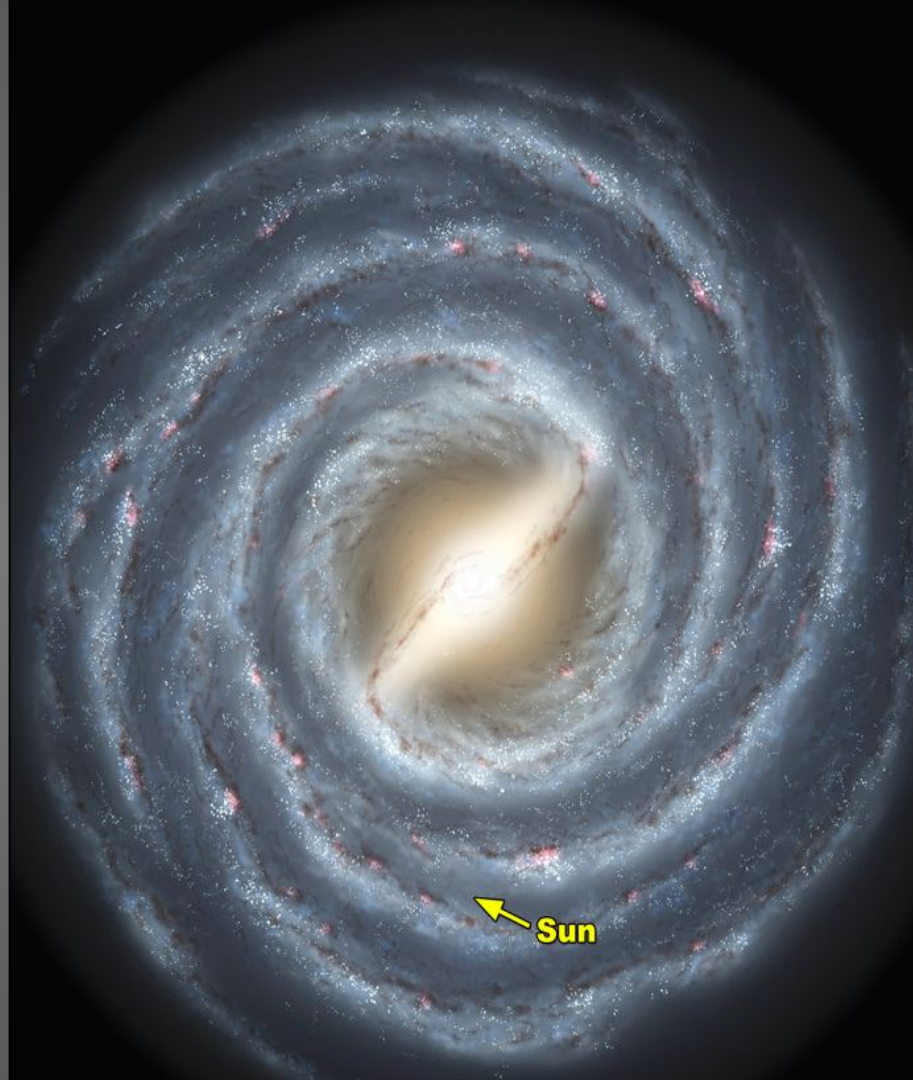


Galaxy Morphology

Galaxies

- A gravitationally bound collection of stars, planets, gas, dust, and dark matter
- Millions, billions, or even trillions of stars

The Milky Way →



Edwin Hubble

- In 1919, Edwin Hubble used the Cepheid Period-Luminosity Relationship (3 labs ago) to prove the universe was vastly bigger than just the Milky Way
 - And that many of the we observed nebulae were actually distant galaxies - of which the Milky Way was just one
- In 1926, he created the classification scheme still largely used today (today's lab)
- In 1929, he proved that galaxies are moving away from us - (next week's lab)



Three Types of Galaxies

Elliptical

- Old, with old, small stars
- Mostly made up of globular clusters
- Very little (if any) new star formation
- How they form is still an area of active research
 - Likely either formed from very rapid star formation, long ago
 - Or formed from the mergers of other galaxies
 - Or maybe both

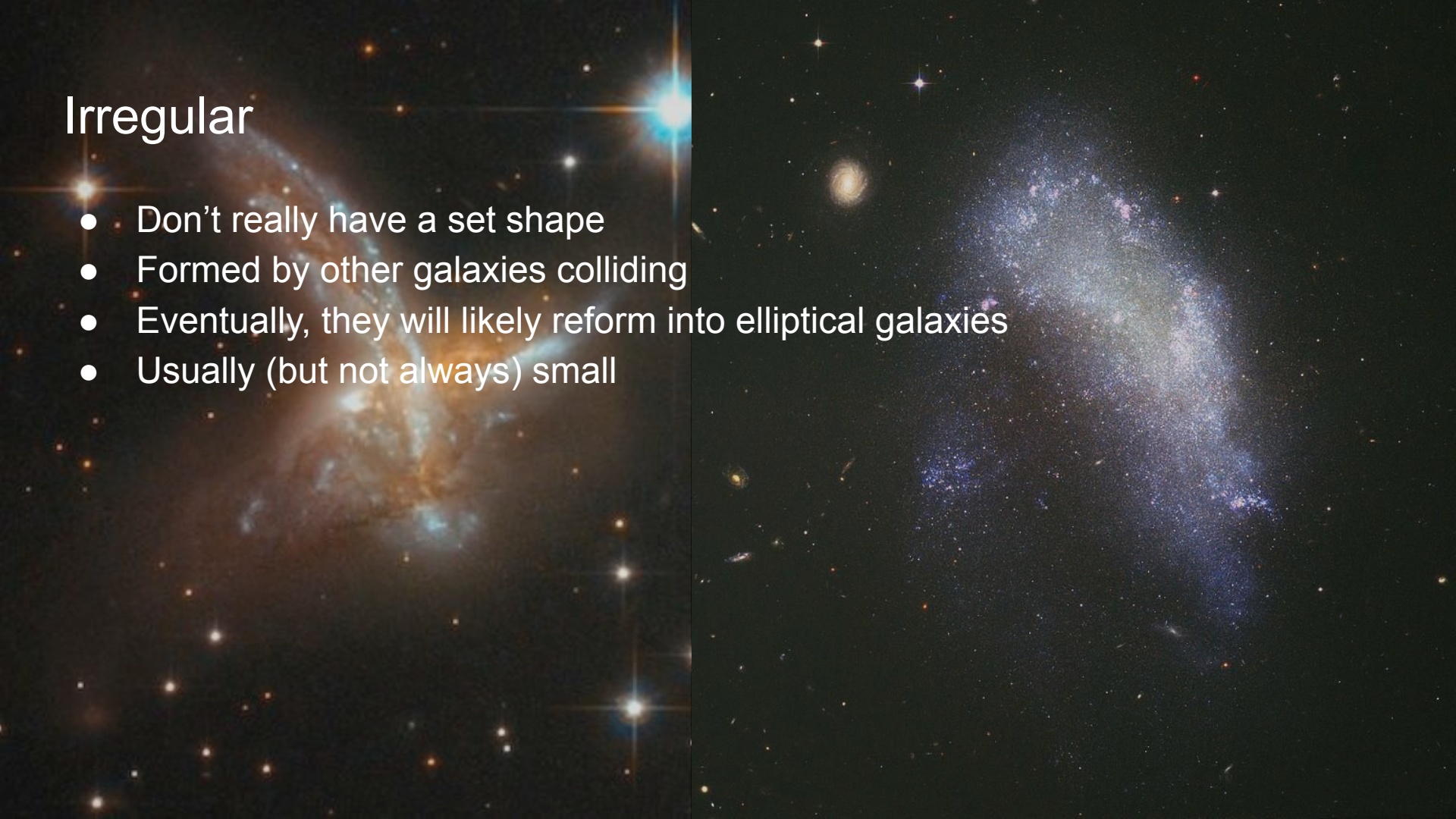
Spiral

- The stereotypical galaxy - like the Milky Way
- A central “bulge” surrounded by spiralling arms
 - The arms are where there is active star formation
 - A spherical “halo” of dark matter
- May be a “barred spiral” - like the Milky Way
 - Or just have the arms come right out of the middle



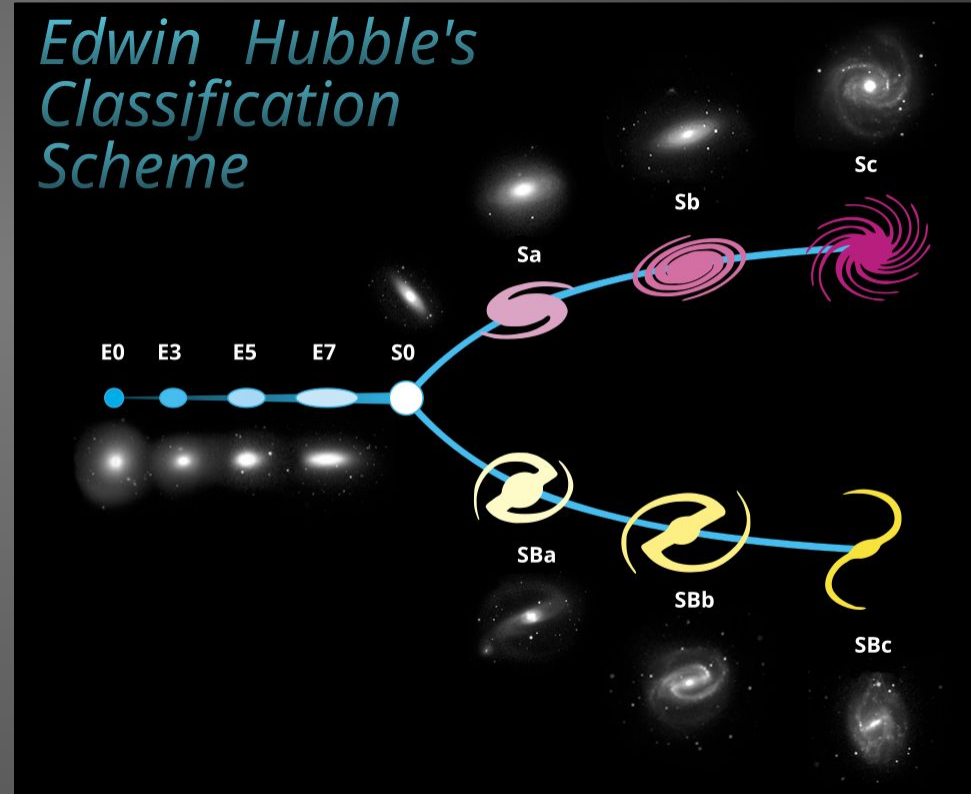
Irregular

- Don't really have a set shape
- Formed by other galaxies colliding
- Eventually, they will likely reform into elliptical galaxies
- Usually (but not always) small



The Classification Scheme

- Elliptical
 - Go from E0 (a sphere) to E7 (oblong)
- Spiral
 - Split into 2 subtypes
 - S, which is the spiral arms coming out of the galaxy's core
 - And SB, which has a "bar" through the middle of the galaxy which the arms come off of
 - Both are broken down into a, b, and c, which have to do with the size of the galactic core
- Irregular
 - Neither Elliptical or Spiral
 - Probably started as one of the others, but was disrupted by interactions with other galaxies



Today

- Very simple lab - look at pictures, then classify them
- Go to <http://windhorst114.asu.edu/galmorph.html> (link on Canvas page)
 - Work down the list, classifying each galaxy as you go
 - Make sure to justify each answer - accuracy is important, but I will be more concerned with the justifications when grading
 - Look at shape, but color can sometimes be helpful too
 - Redder galaxies are older, and so have less star formation
 - Bluer are younger, and have more active star formation
- Answer questions 1-7 after classifying the galaxies and make sure to do the conclusion/summary on the bottom of page 5