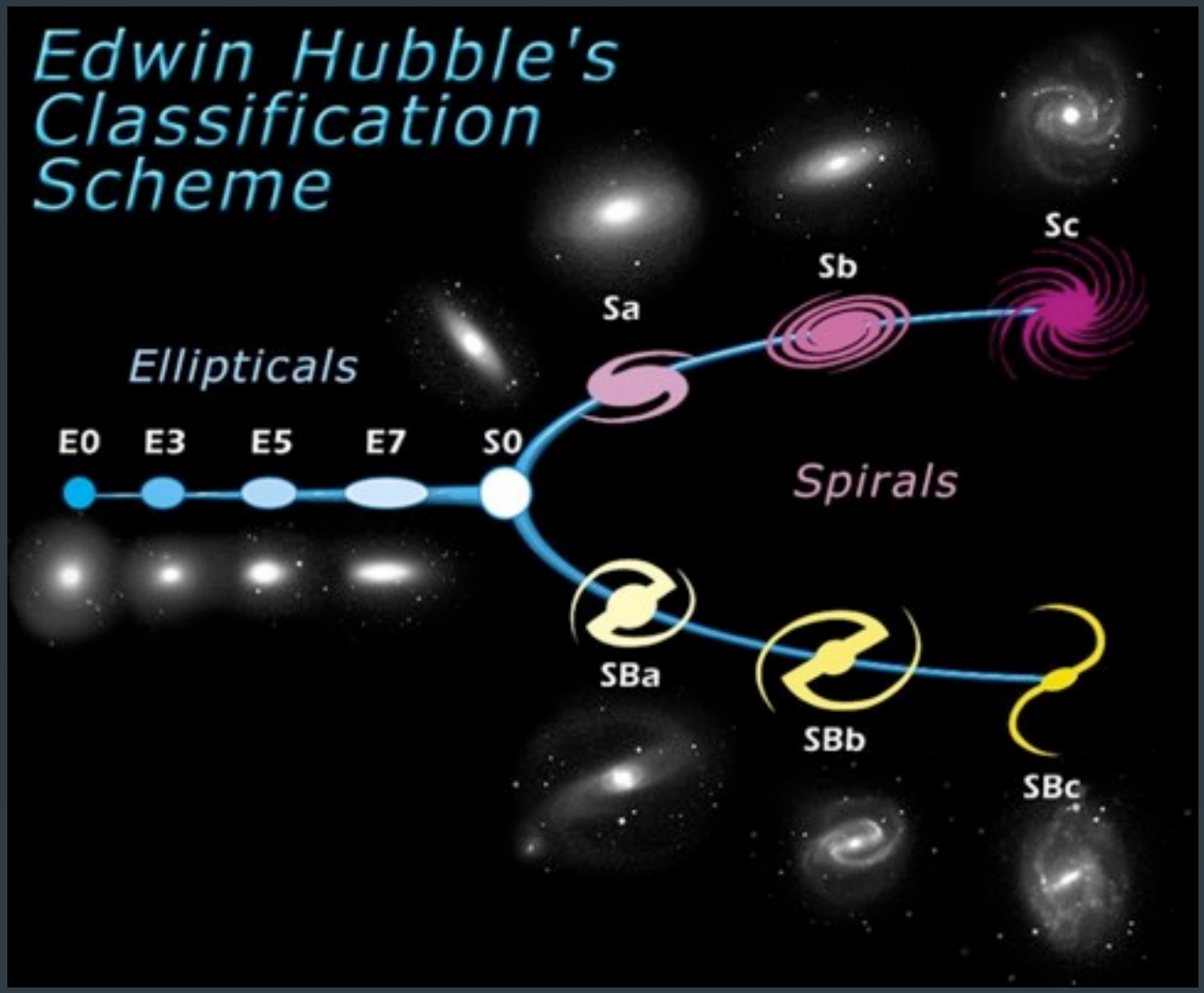
# ASTR 1020

## Last Lab: Classification of Galaxies

# Hubble's Galaxy Tuning Fork

Galaxies come in all sorts of shapes and sizes. Here's a way to classify them. Galaxies not on the chart are called irregular galaxies.



# Young Blue, Old Red

The handle of the tuning fork differs from the tines in a fundamental way: Spiral galaxies (barred and not) are young and blue, with active star formation. Elliptical galaxies are old and red, with an aging stellar population and almost no new star formation. Irregular galaxies are also often blue.

Young Blue Spiral

Old Red Elliptical

# Spiral Galaxy, Type SB# or S#

Spiral galaxies are young and fast-rotating in a plane. The gas in the arms glows blue with active star formation. The bulge in the middle hosts older, redder stars. About two thirds of spiral galaxies are barred, and the rest are not. The bars also host star formation. It is believed bars come and go.

Barred, SB#

Unbarred, S#

# Lenticular Galaxy, Type S0

A lenticular galaxy is an old spiral galaxy. It has a spiral form but has ceased most star-forming activity. These galaxies are classified as S0 galaxies.

# Elliptical Galaxy, Type E#

Ellipticals are “red and dead.” They are large, old galaxies that have ceased star formation. The aging stellar population circles the central supermassive black hole in somewhat random orbits. Elliptical galaxies may result from galaxy mergers, during which spurts of star formation may occur.

# Irregular Galaxy, Type Sm or Irr

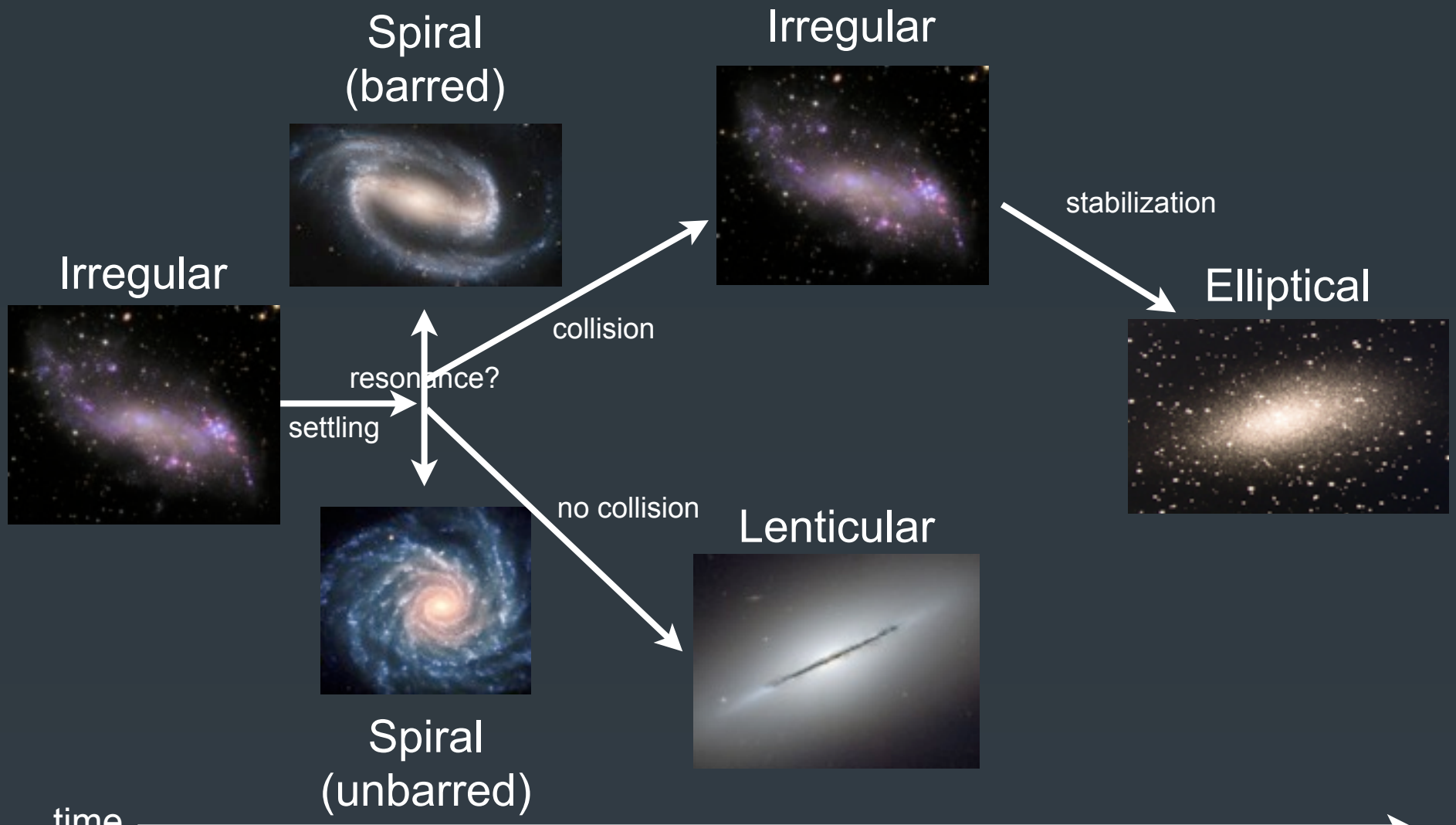
Irregular galaxies are either new gas or the result of a galactic collision or near miss. Because irregular galaxies are full of new gas, or result from a traumatic event (collision or near miss with strong gravitational interaction), they are often blue with star formation.

Note that while galactic collisions can cause star formation, they rarely involve individual stellar collisions because stars are so far apart.

Irregular galaxies with some semblance of spiral structure are classified as Sm galaxies. Those with no structure at all are Irr.

# Galaxy Evolution

Formation order of galactic shapes ***may*** proceed something like this:



# Fin

# Ring