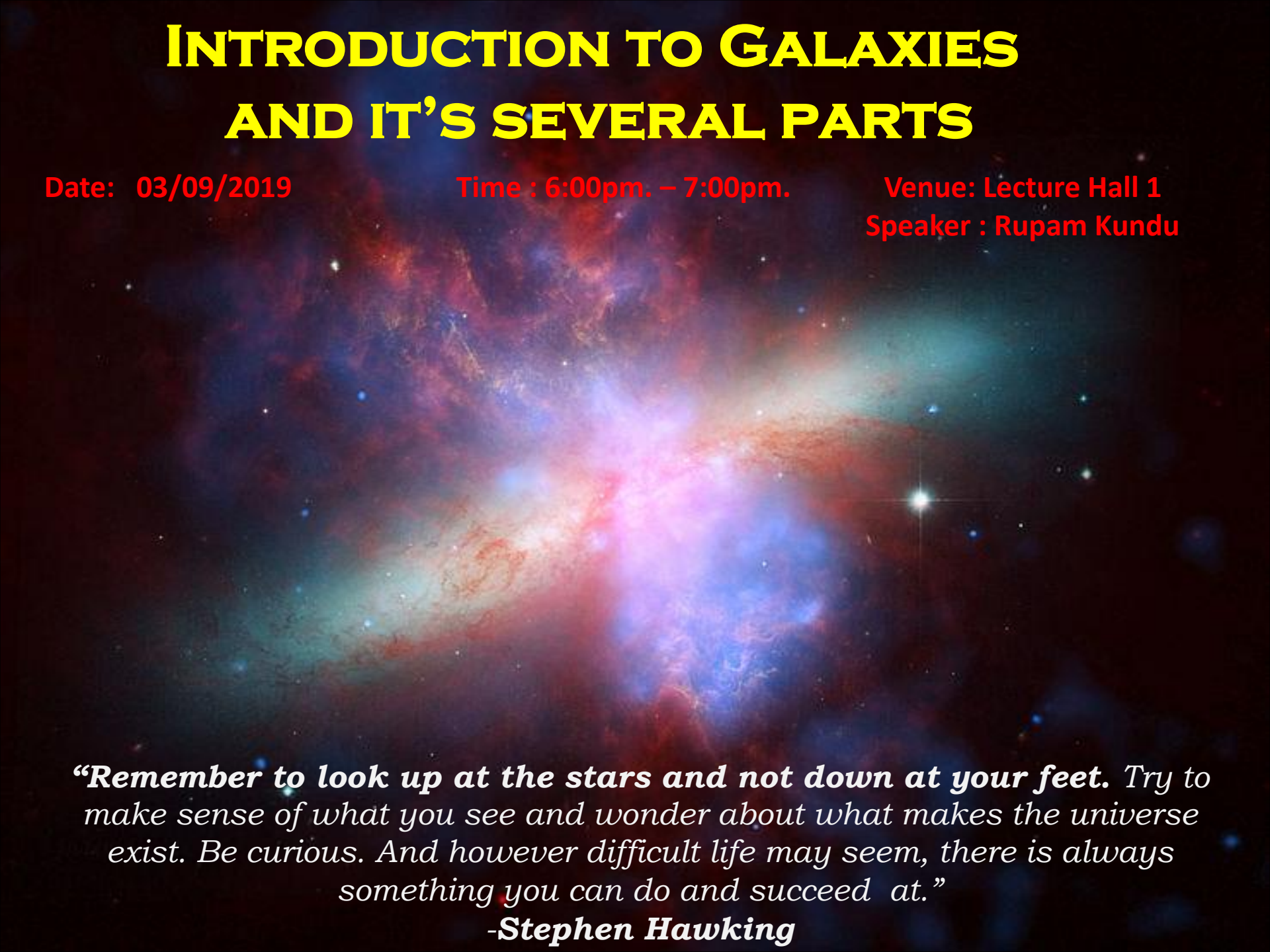
Introduction to Galaxies and it's several parts

Date: 03/09/2019 **Time : 6:00pm. – 7:00pm.** **Venue: Lecture Hall 1**

Speaker : Rupam Kundu



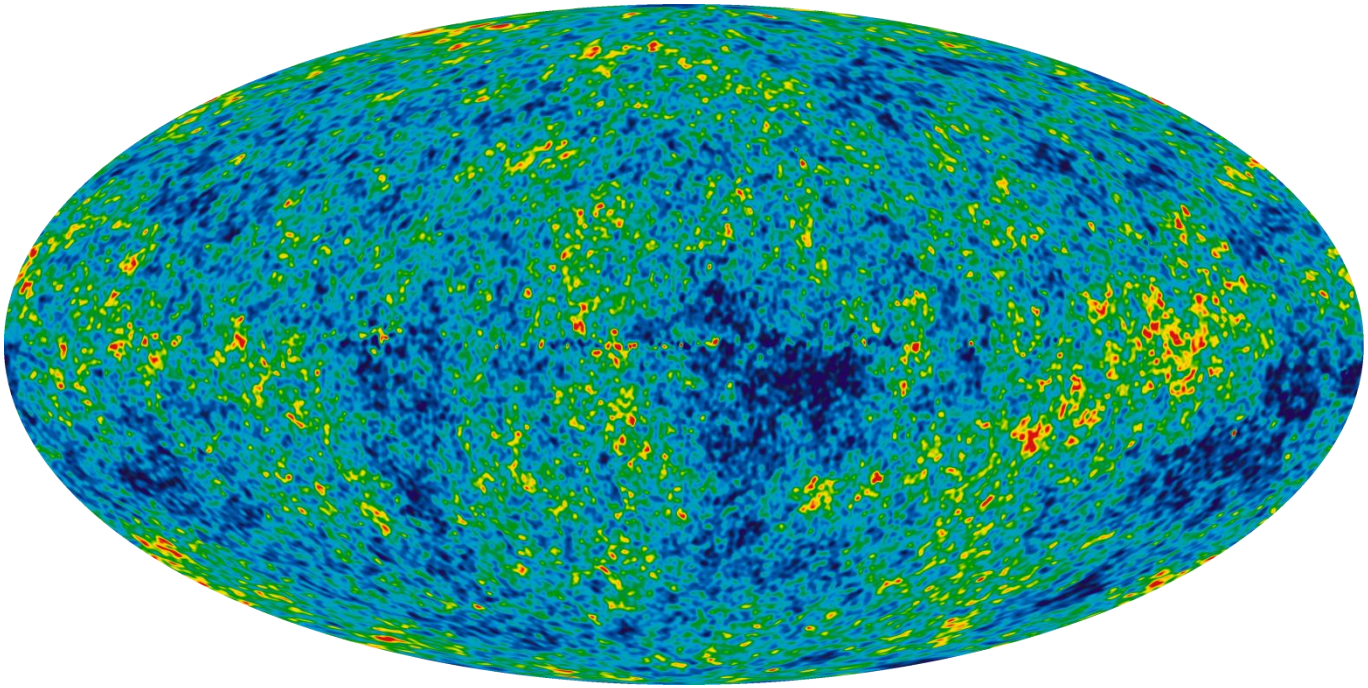
"Remember to look up at the stars and not down at your feet. *Try to make sense of what you see and wonder about what makes the universe exist. Be curious. And however difficult life may seem, there is always something you can do and succeed at."*

-Stephen Hawking


WHAT IS A GALAXY ???

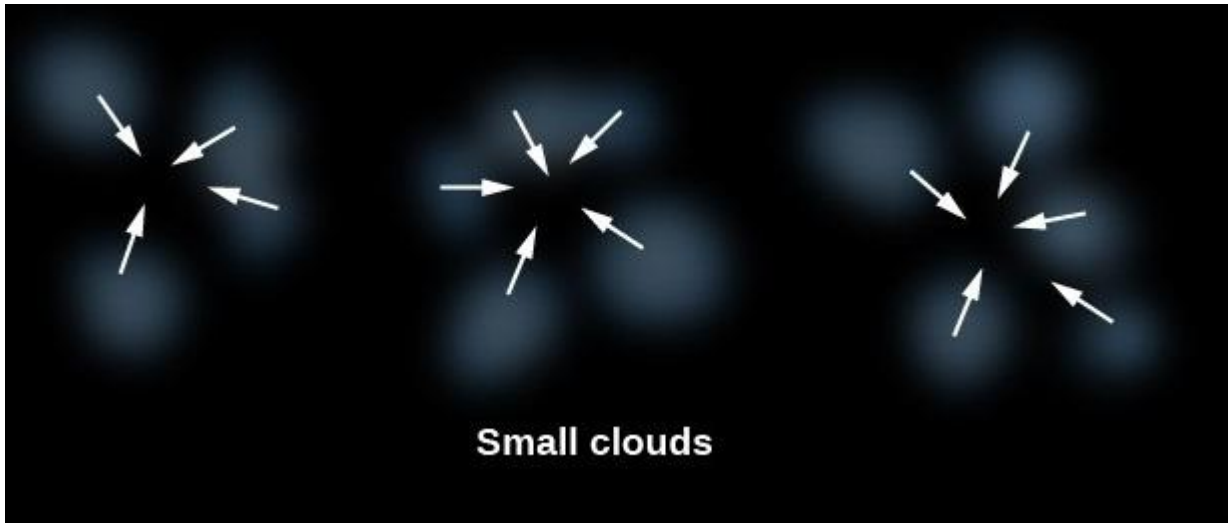
FORMATION OF GALAXIES

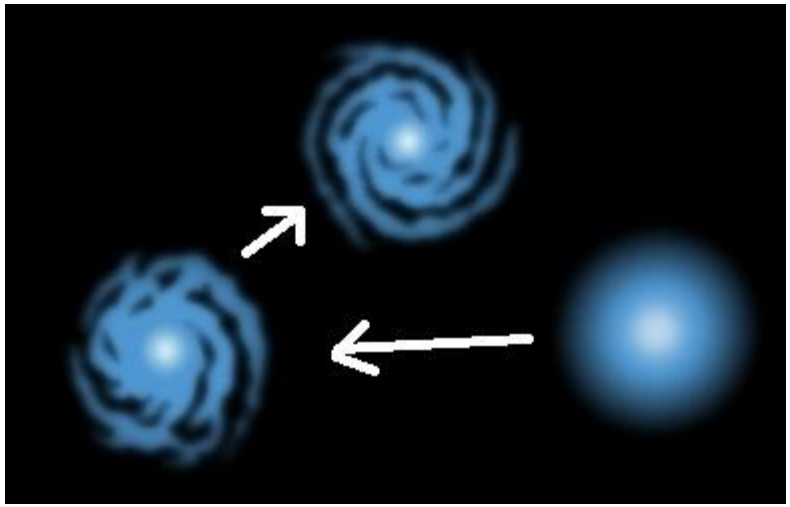
Lambda-Cdm model

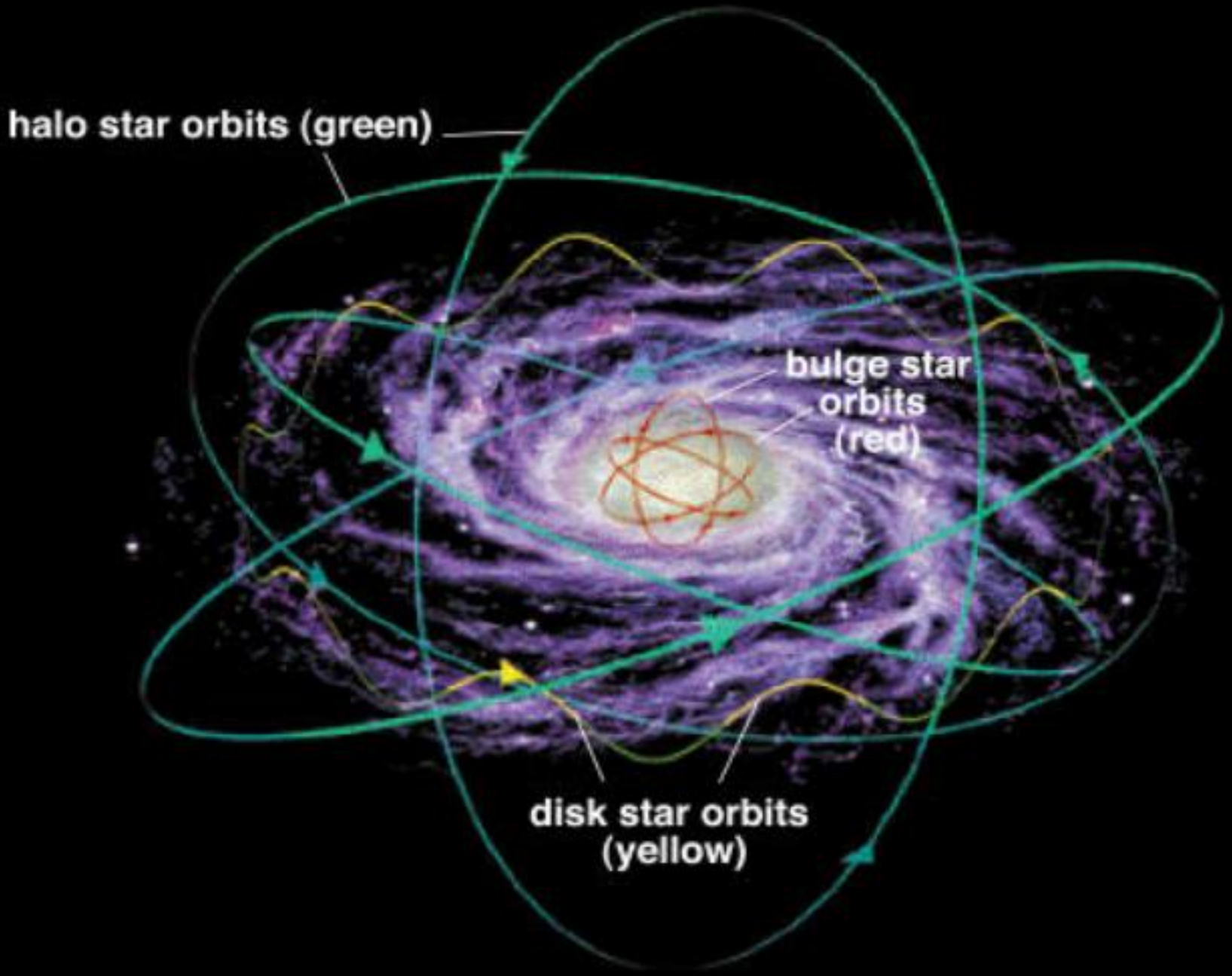


[Lambda-cdm model is a simple model which describes the clustering of gas and merging of newly formed galaxies, very easily.]

Bottom-Up Theory





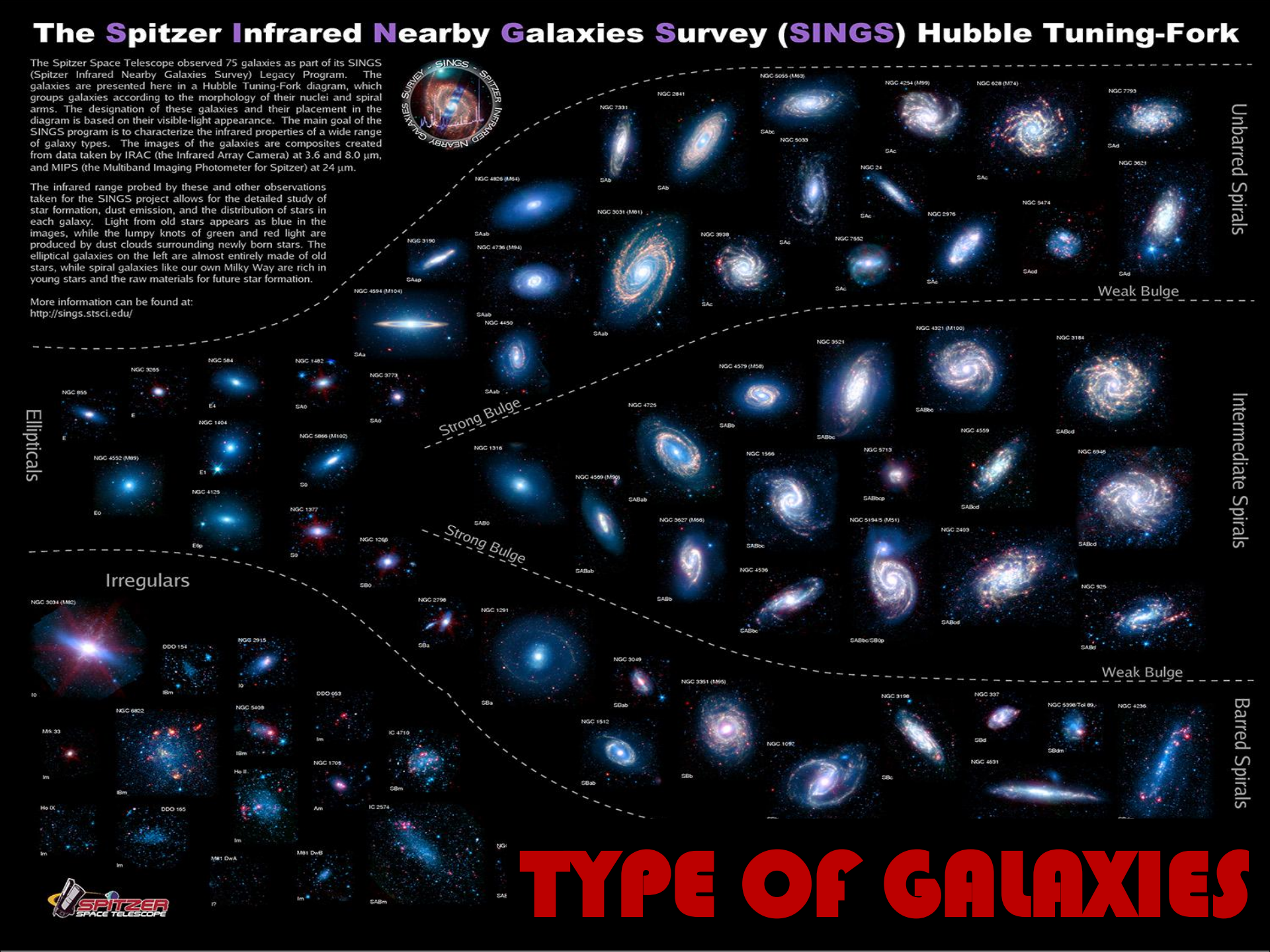

halo star orbits (green)
bulge star orbits (red)
disk star orbits (yellow)

The Spitzer Infrared Nearby Galaxies Survey (SINGS) Hubble Tuning-Fork

The Spitzer Space Telescope observed 75 galaxies as part of its SINGS (Spitzer Infrared Nearby Galaxies Survey) Legacy Program. The galaxies are presented here in a Hubble Tuning-Fork diagram, which groups galaxies according to the morphology of their nuclei and spiral arms. The designation of these galaxies and their placement in the diagram is based on their visible-light appearance. The main goal of the SINGS program is to characterize the infrared properties of a wide range of galaxy types. The images of the galaxies are composites created from data taken by IRAC (the Infrared Array Camera) at 3.6 and 8.0 μm, and MIPS (the Multiband Imaging Photometer for Spitzer) at 24 μm.

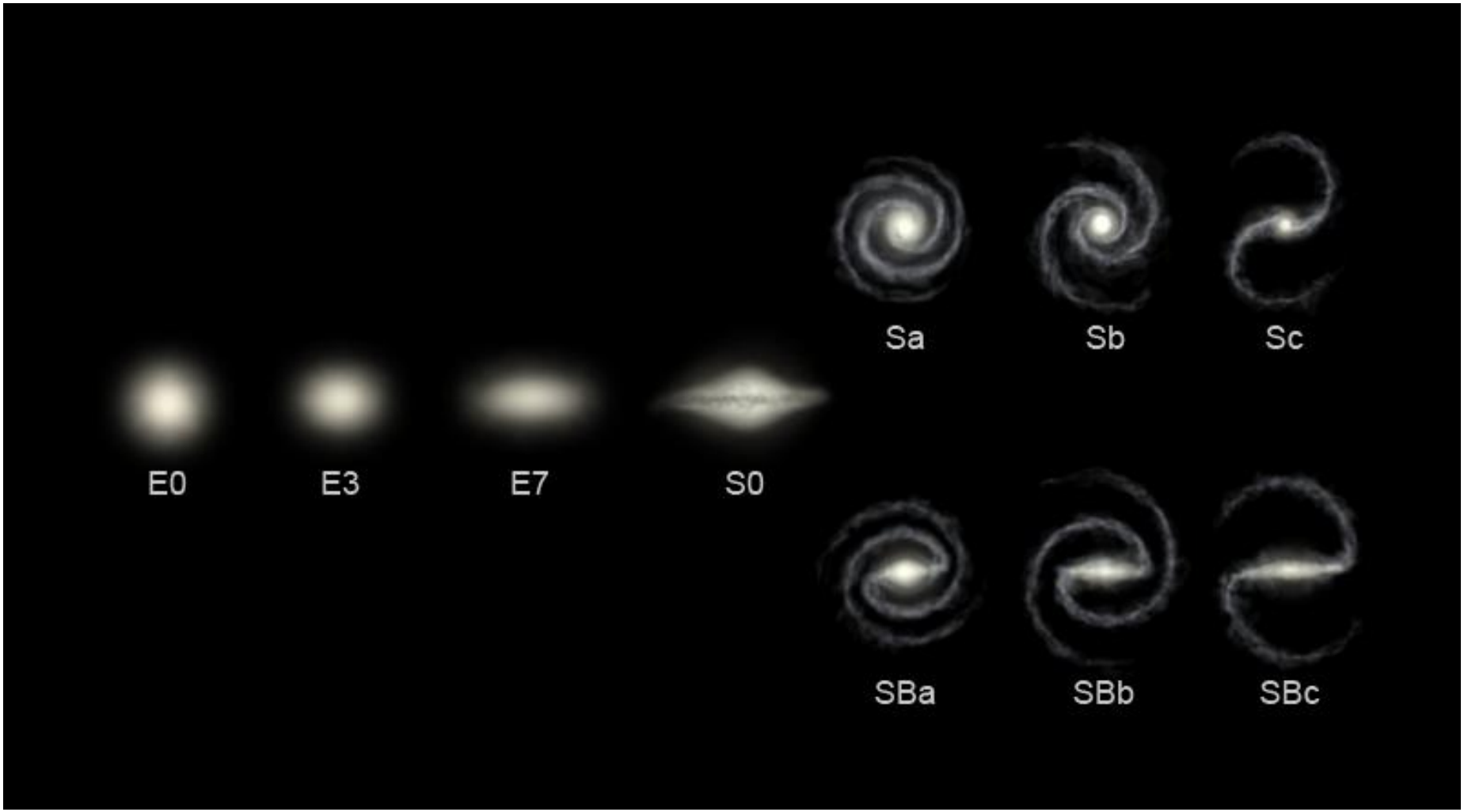
The infrared range probed by these and other observations taken for the SINGS project allows for the detailed study of star formation, dust emission, and the distribution of stars in each galaxy. Light from old stars appears as blue in the images, while the lumpy knots of green and red light are produced by dust clouds surrounding newly born stars. The elliptical galaxies on the left are almost entirely made of old stars, while spiral galaxies like our own Milky Way are rich in young stars and the raw materials for future star formation.

More information can be found at:
http://sings.stsci.edu/



TYPE OF GALAXIES

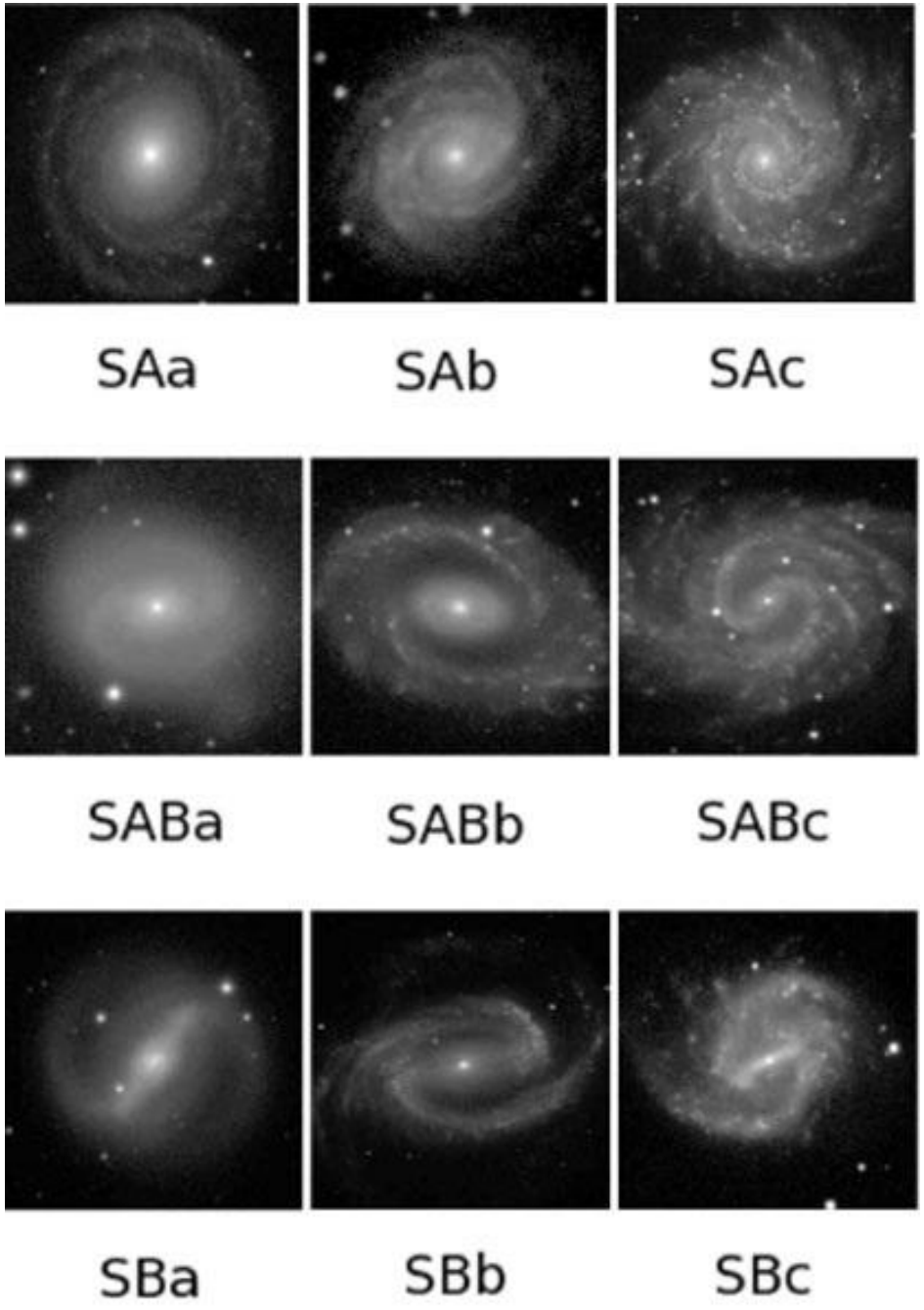
Hubble Sequence



1. SPIRAL GALAXIES

DIFFERENT SPIRAL GALAXIES

(Basis of bulge size and compactness of arms)

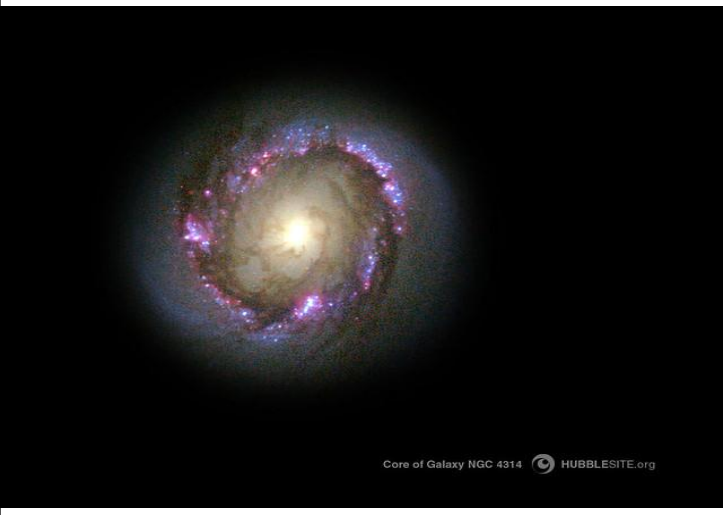


‘SAa’ type galaxy

‘SAab’ type
[Seyfert Galaxy]

‘SAb’ type galaxy

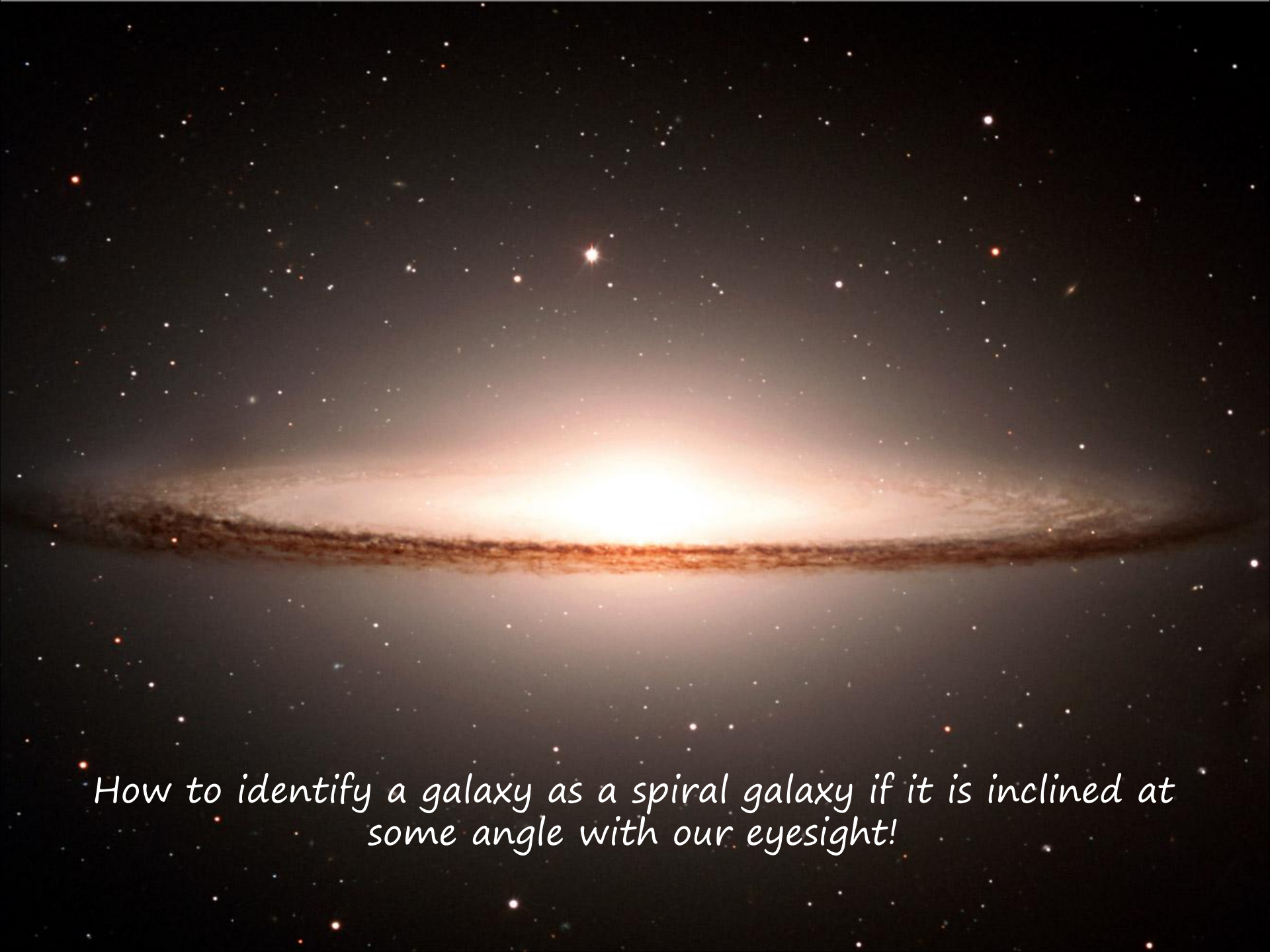
‘SAc’ type galaxy



‘SBa’ galaxy (NGC 4314)

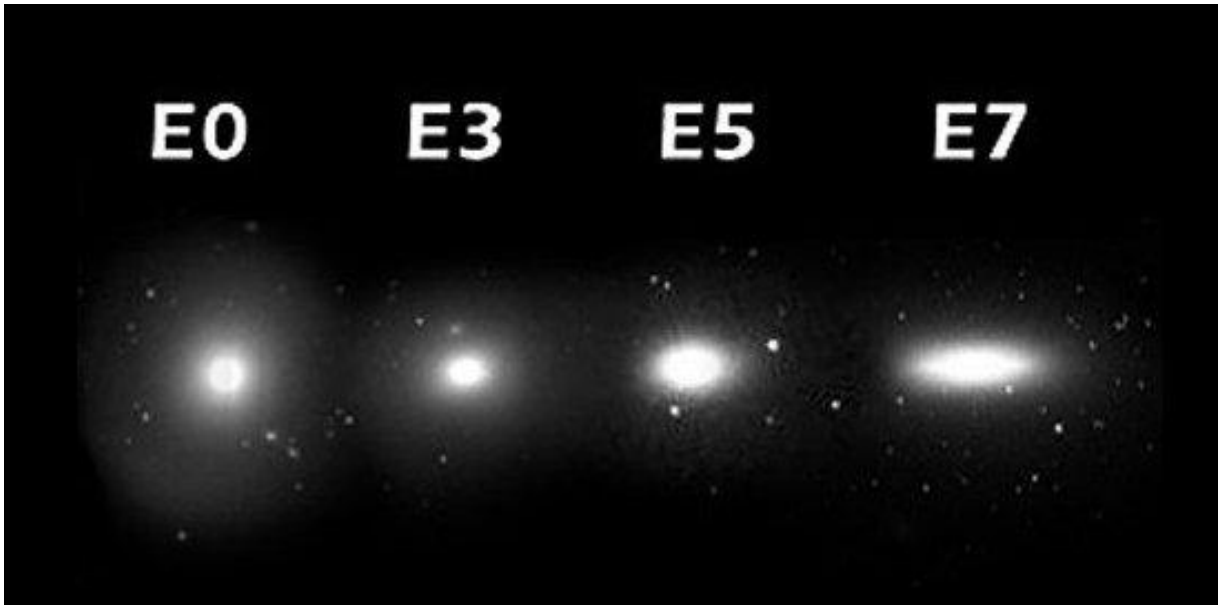
‘SBb’ galaxy (NGC 1365)

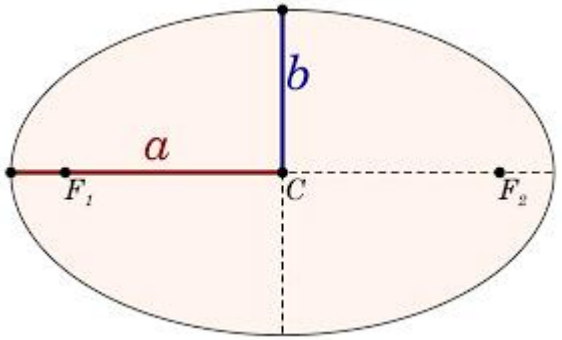
‘SBc’ galaxy

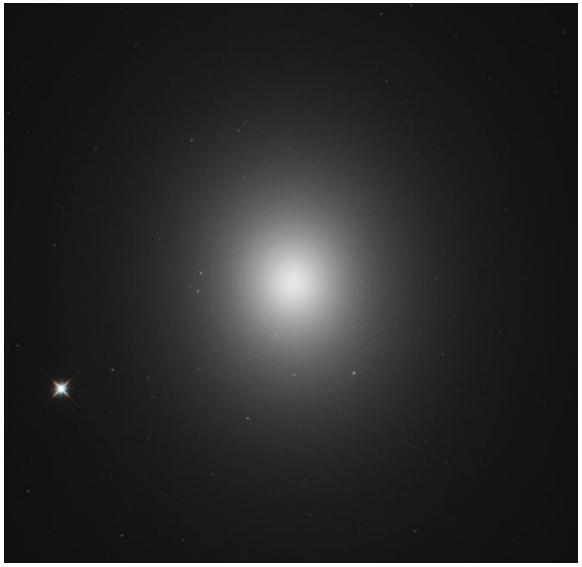

How to identify a galaxy as a spiral galaxy if it is inclined at some angle with our eyesight!

2. Elliptical galaxies

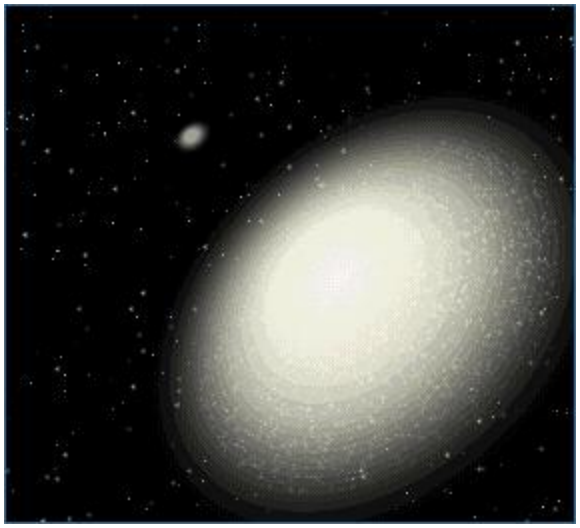
Elliptical Galaxies are basically divided in seven categories. ie,
E0 , E1 , E2 , E3 , E4 , E5 , E6 & E7







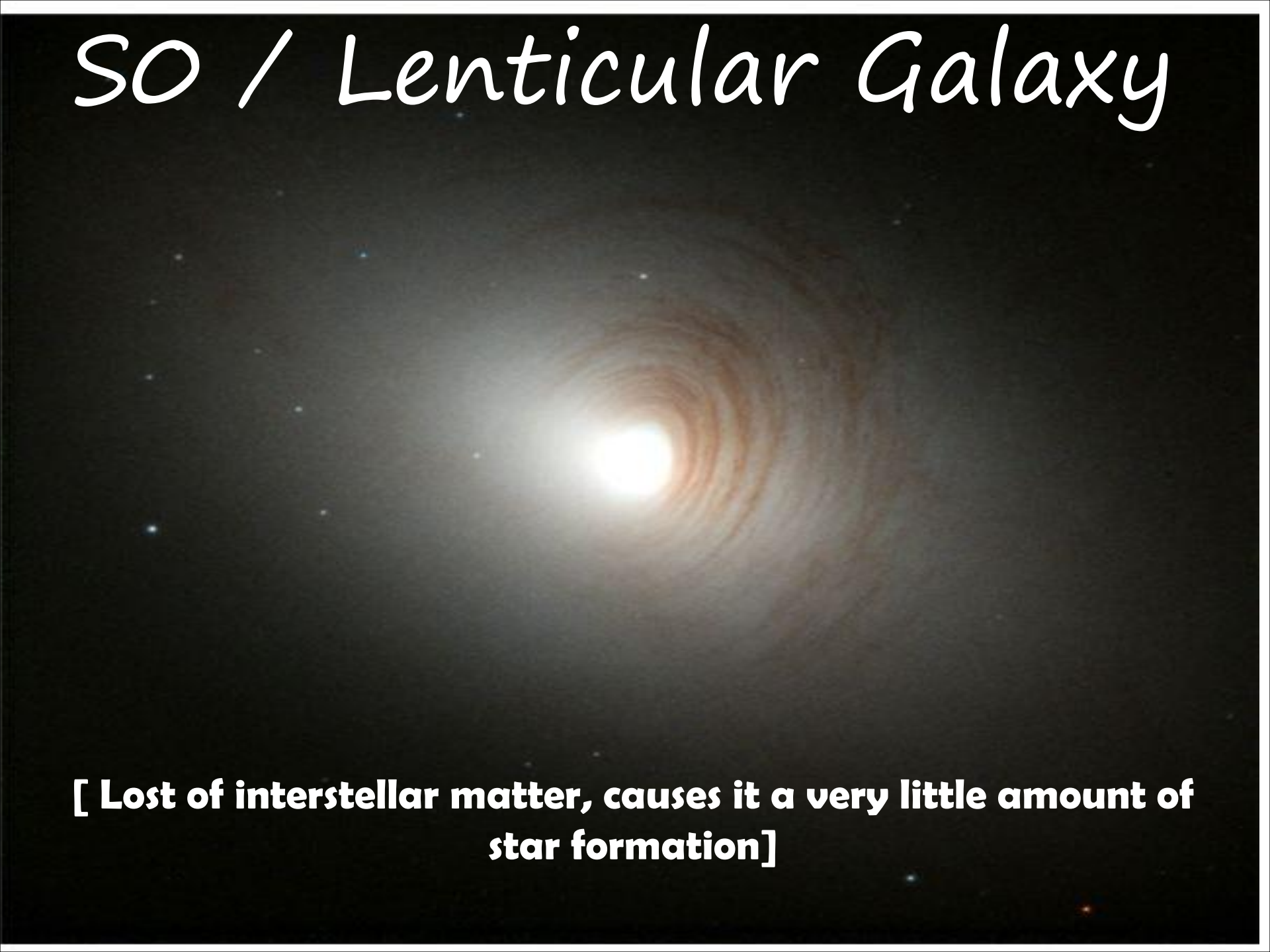
M49 (E2 type)



M84 (E3 type)

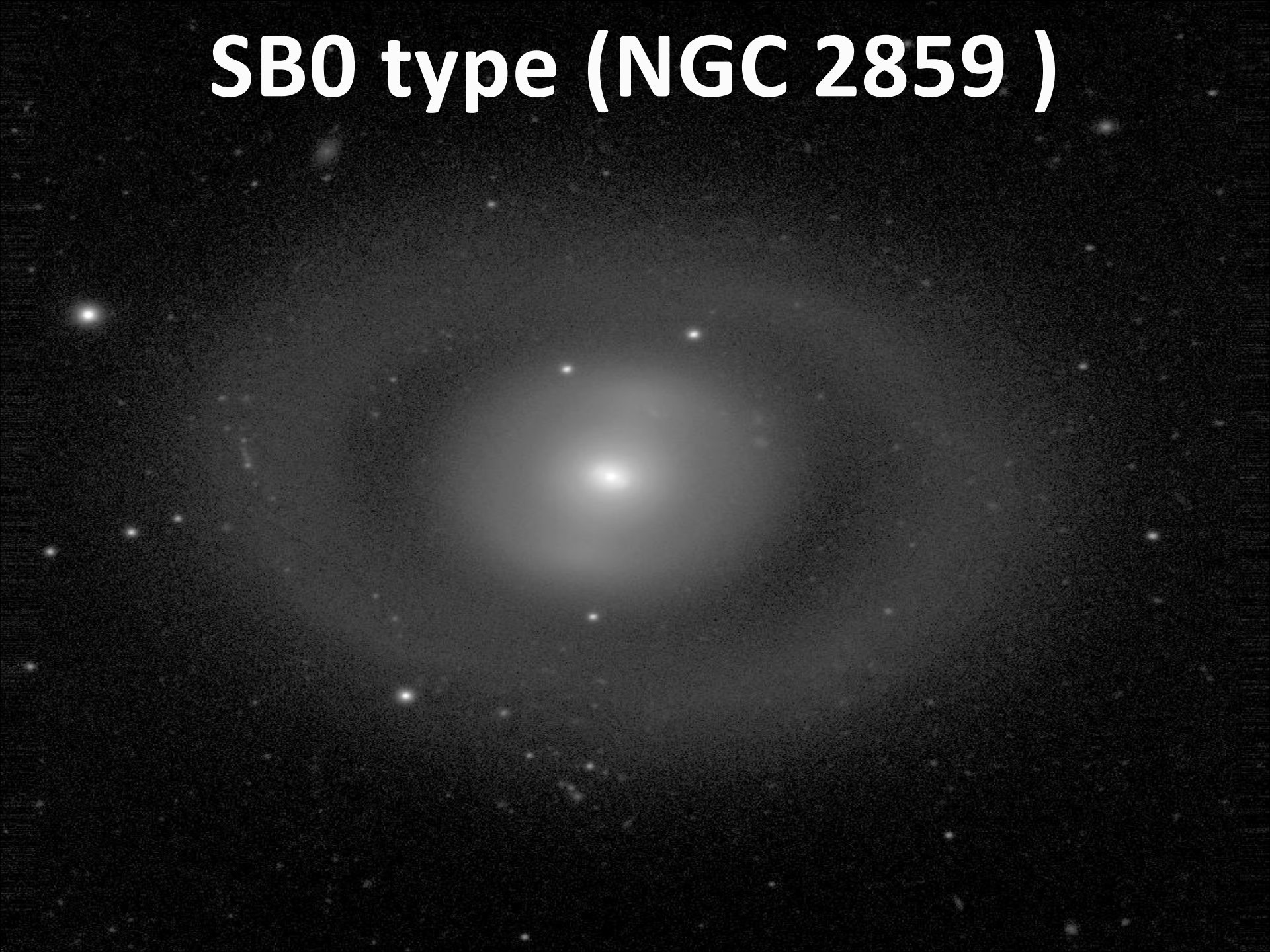
M110 (E5 type)

SO / Lenticular Galaxy



[Lost of interstellar matter, causes it a very little amount of star formation]

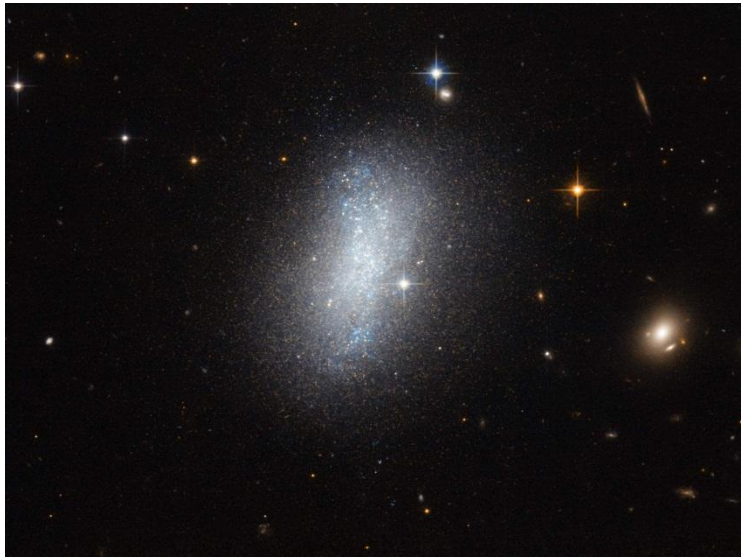
SB0 type (NGC 2859)



Irregular Galaxy

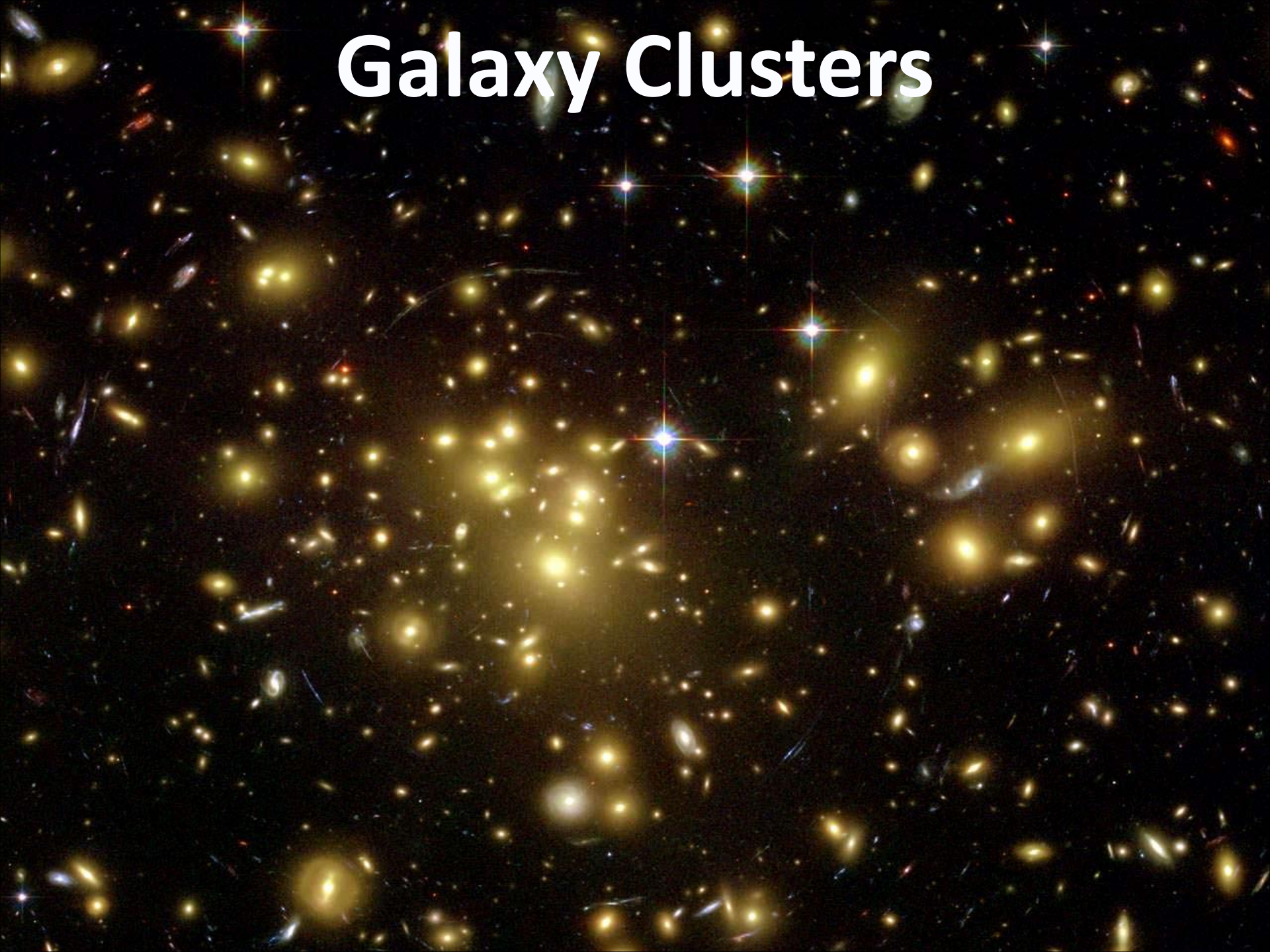
Irregular Galaxy
Type 1

Irregular Galaxy
Type 2



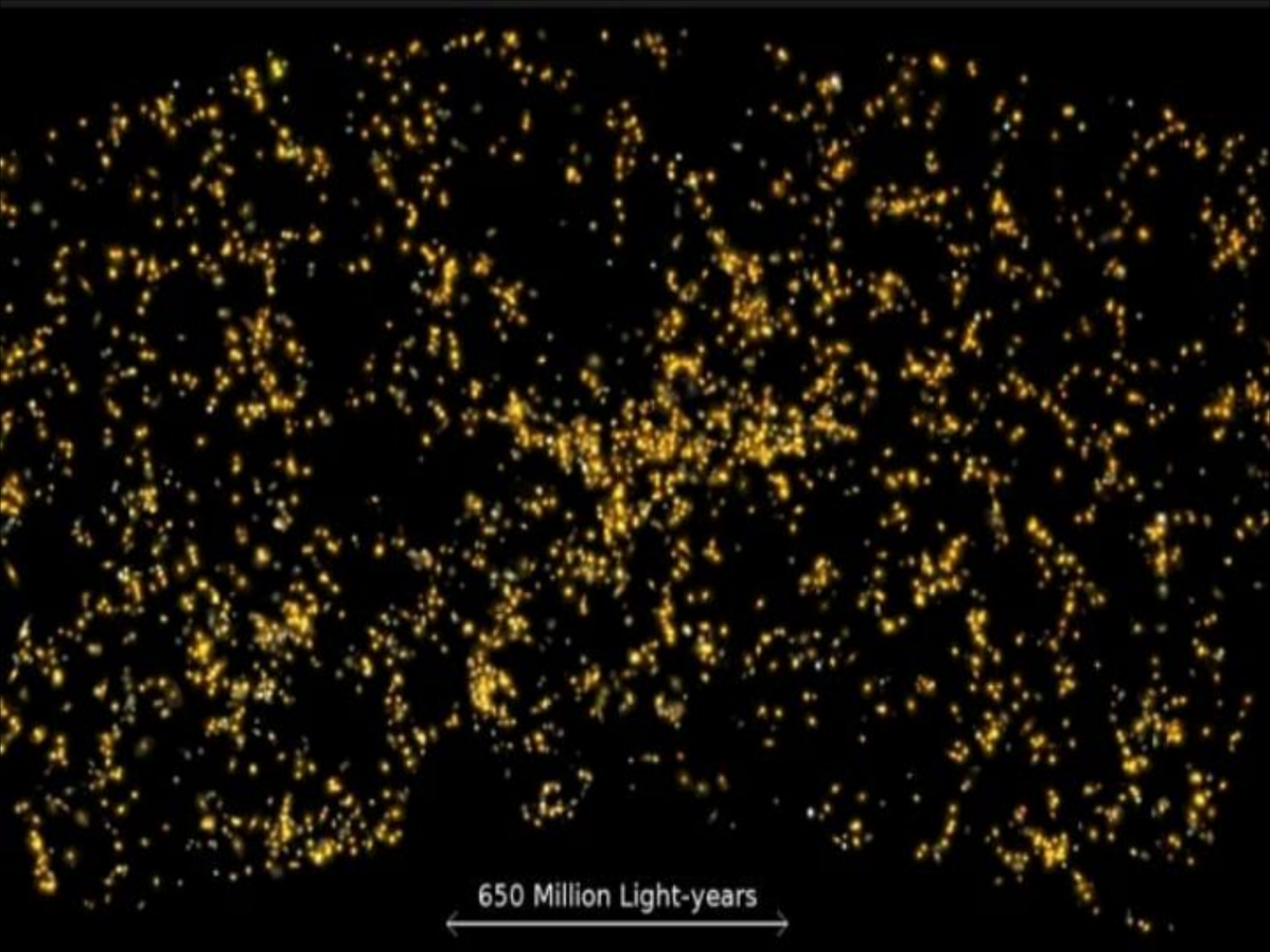
Dwarf Galaxy

Galaxy Clusters



Vigro Cluster

[Diameter of local group = 1MPC, Distance = 18 MPC]

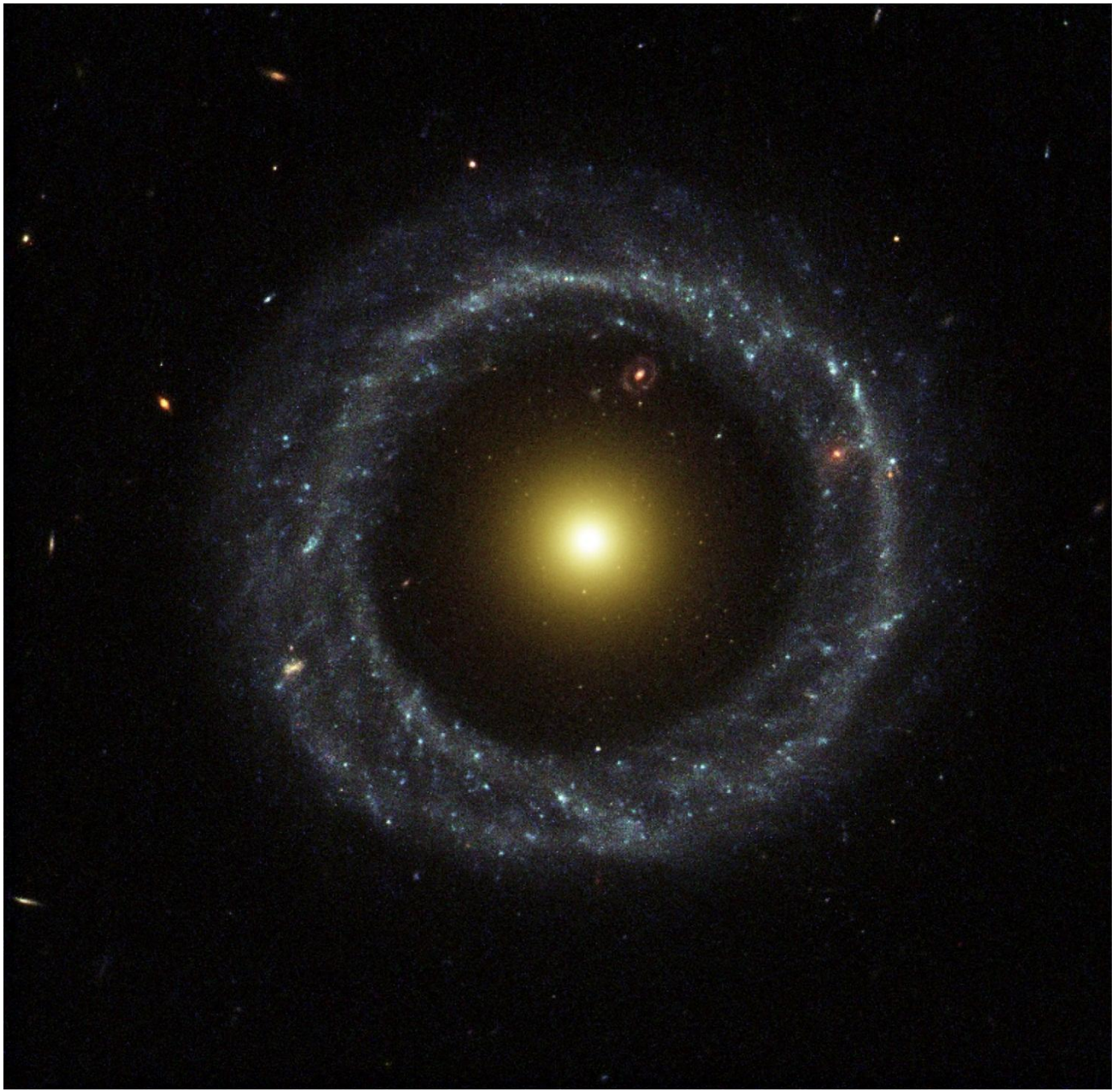

650 Million Light-years

Seyfert Galaxy

1. Energetic Nucleus
2. Energetic galaxy
3. Small compact nucleus, shows deviation of brightness

Circinus Galaxy

Hoag's Object




Thank You !