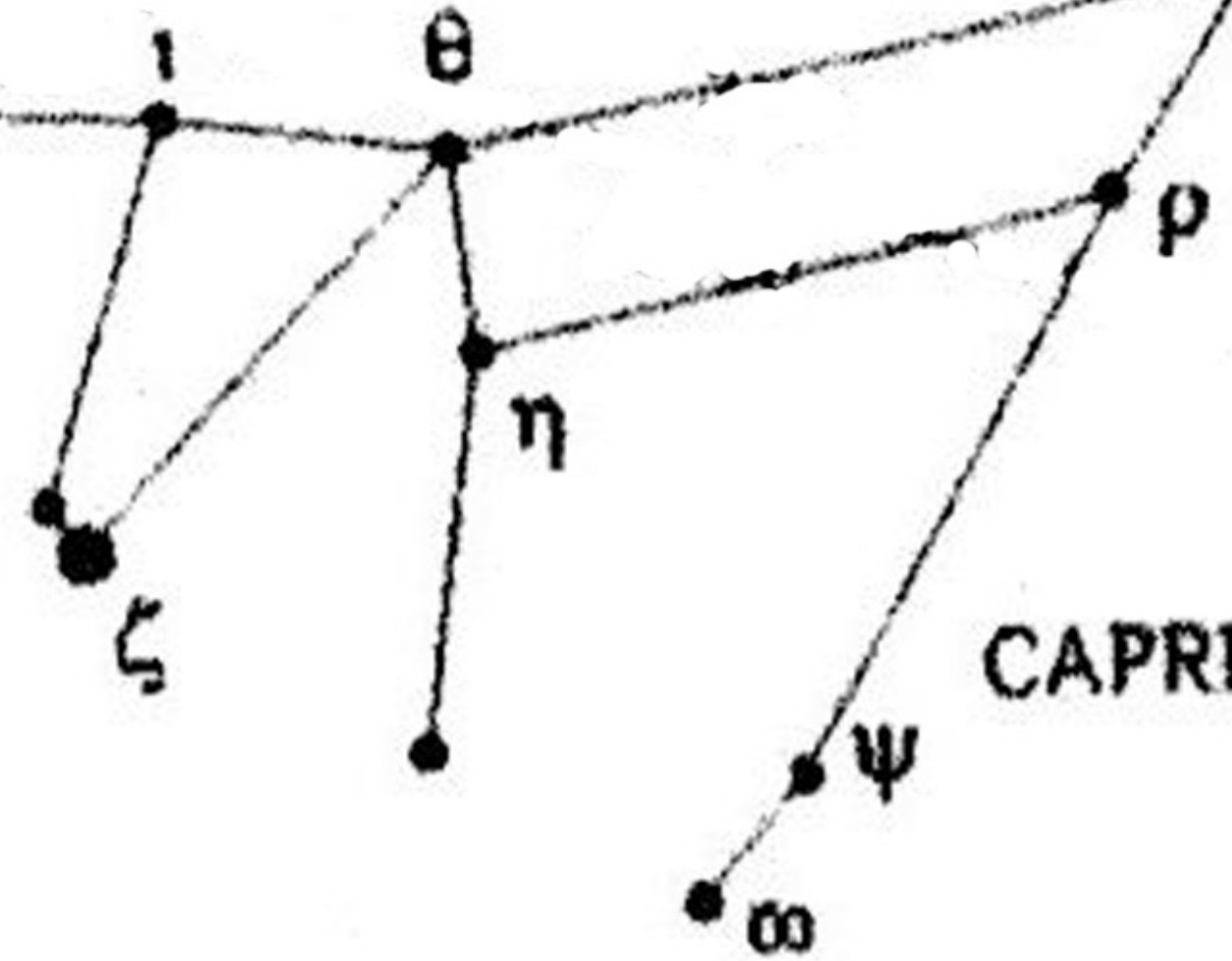


Deneb Algedi

$\delta$   
 $\gamma$   
Nashira

$\alpha$  Algedi

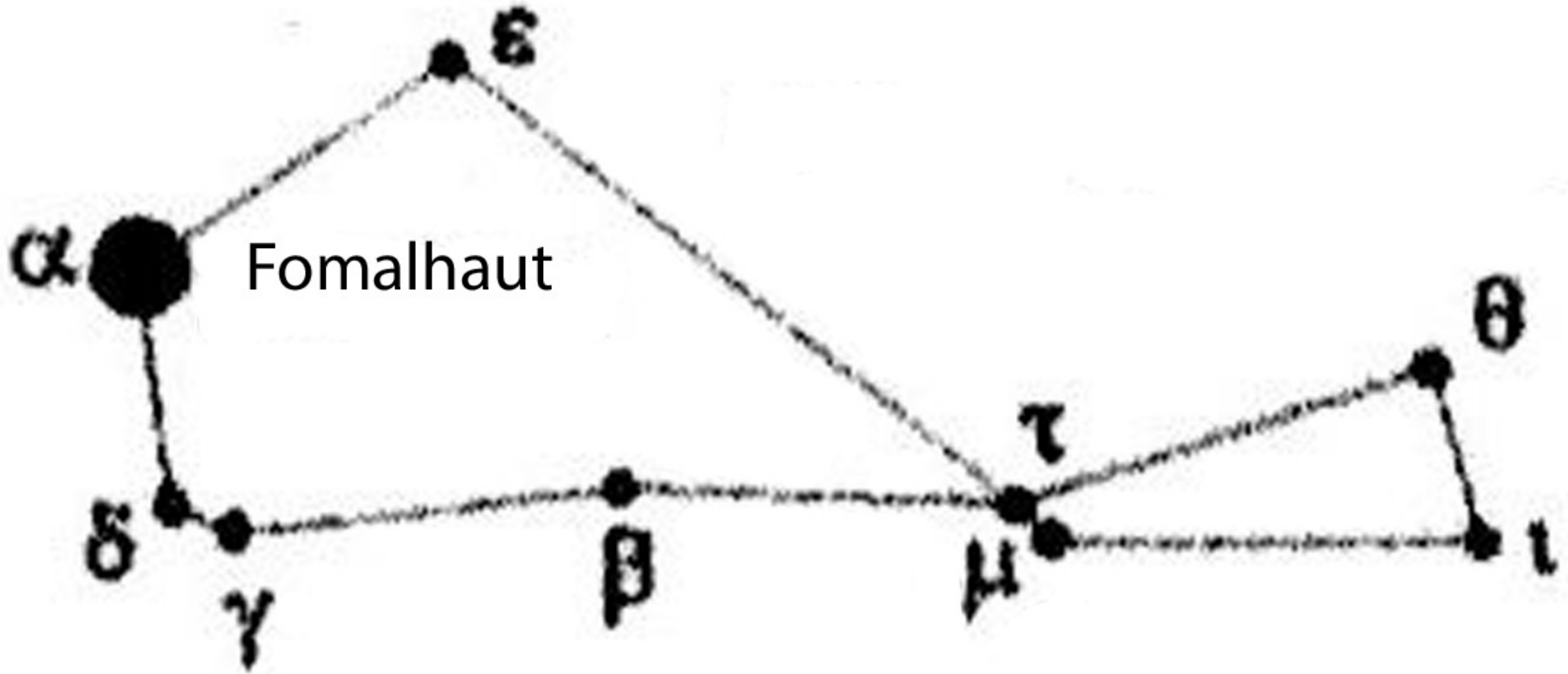
$\beta$  Dabih

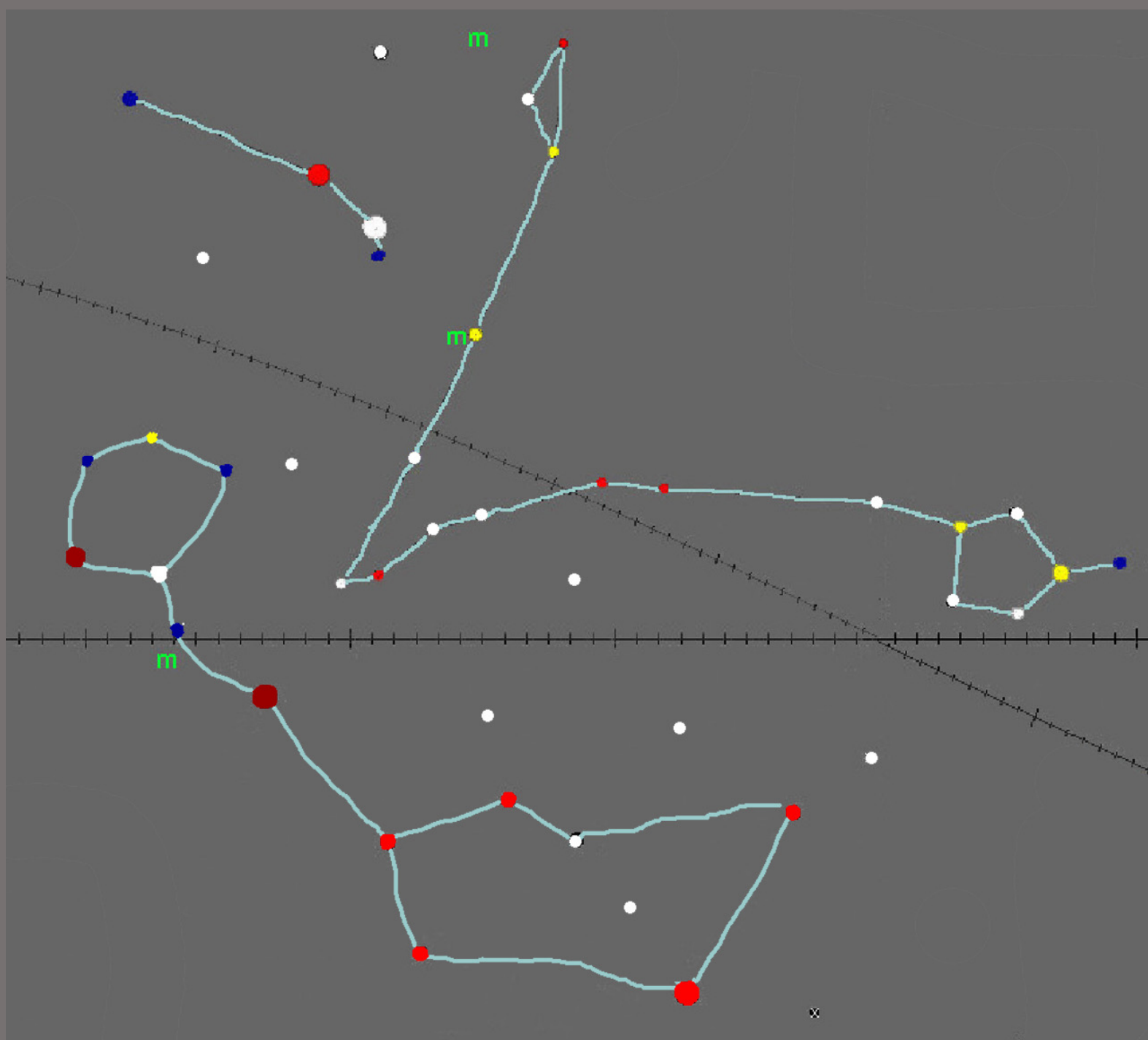


**CAPRICORNUS**

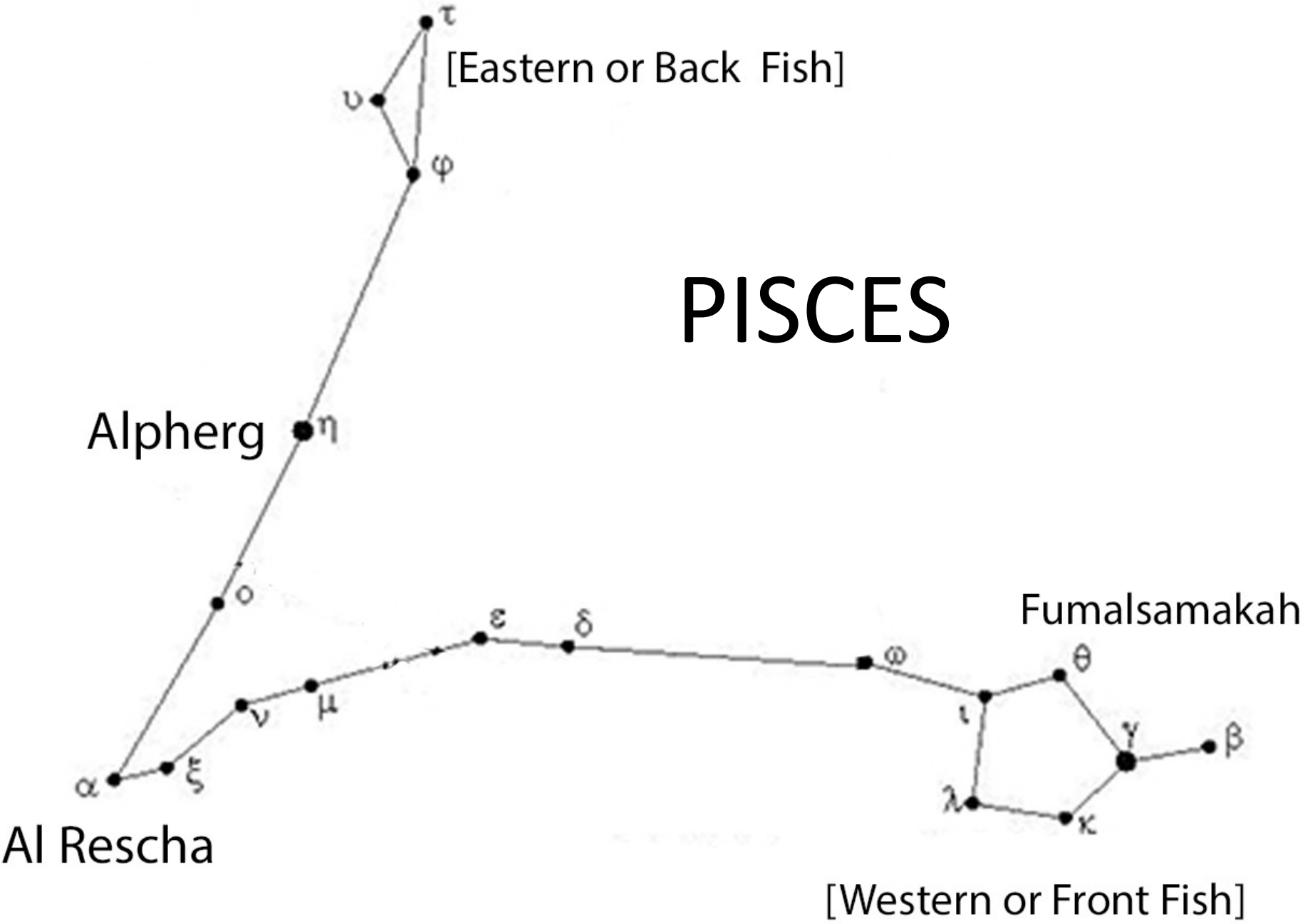


# Piscis Austrinus

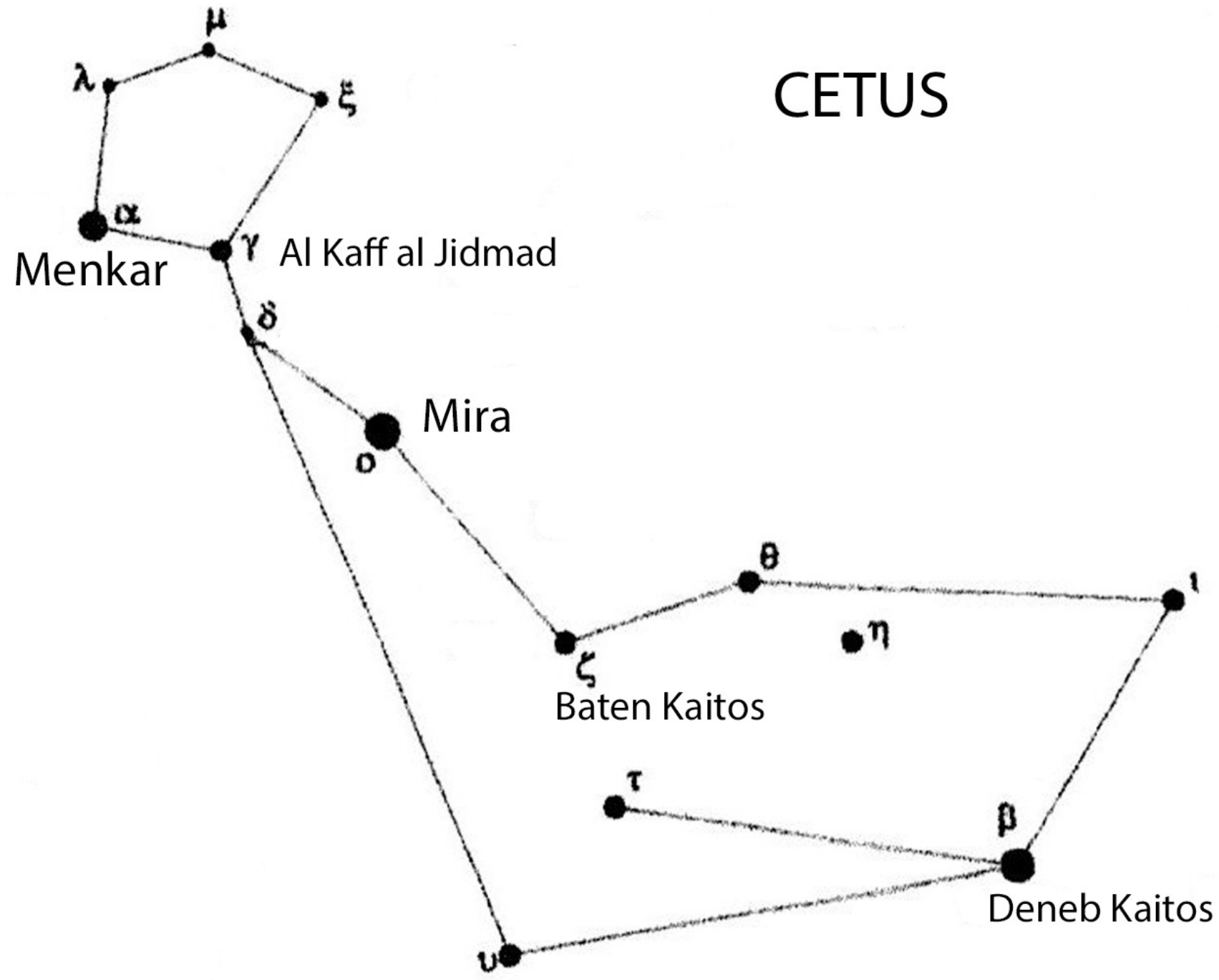


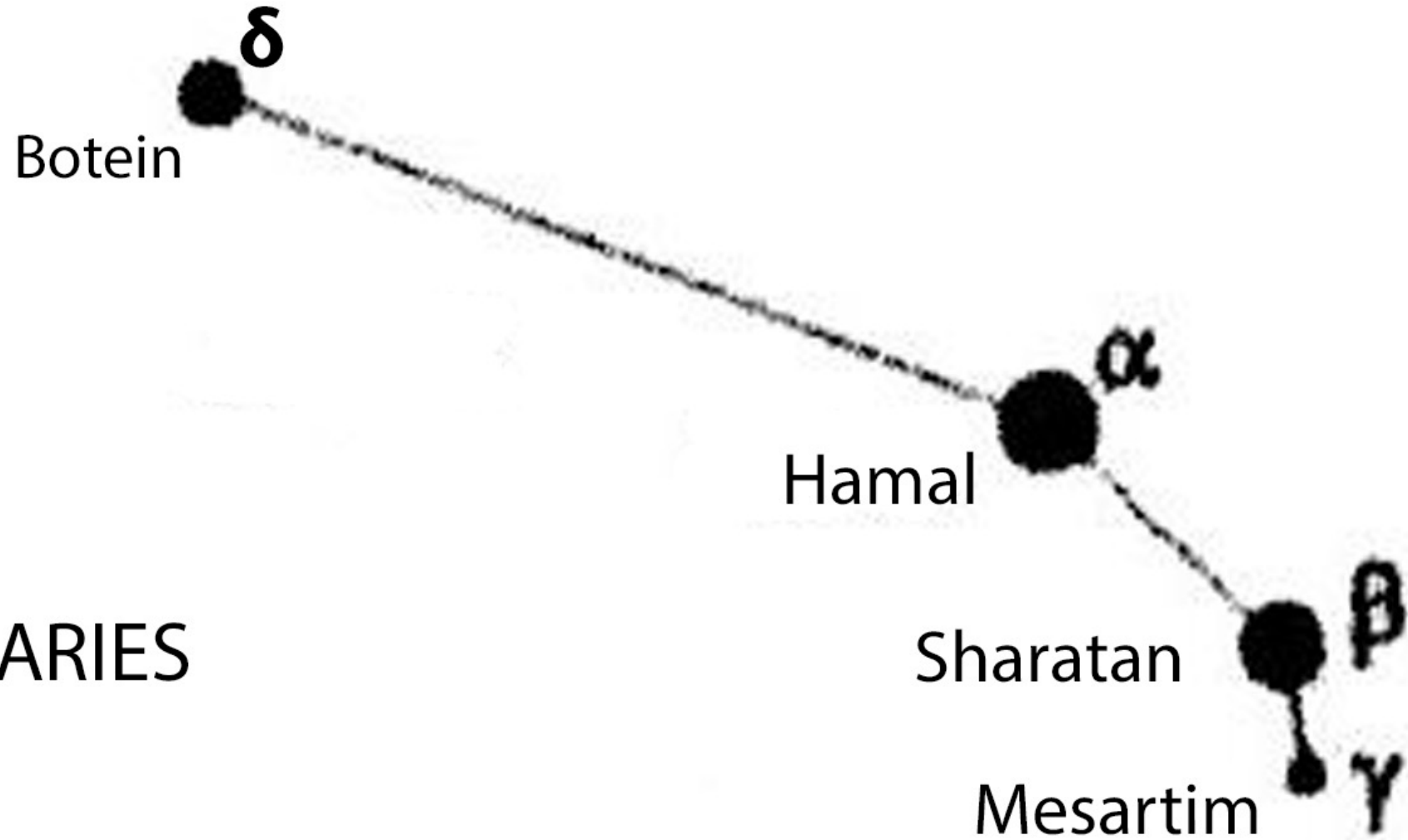


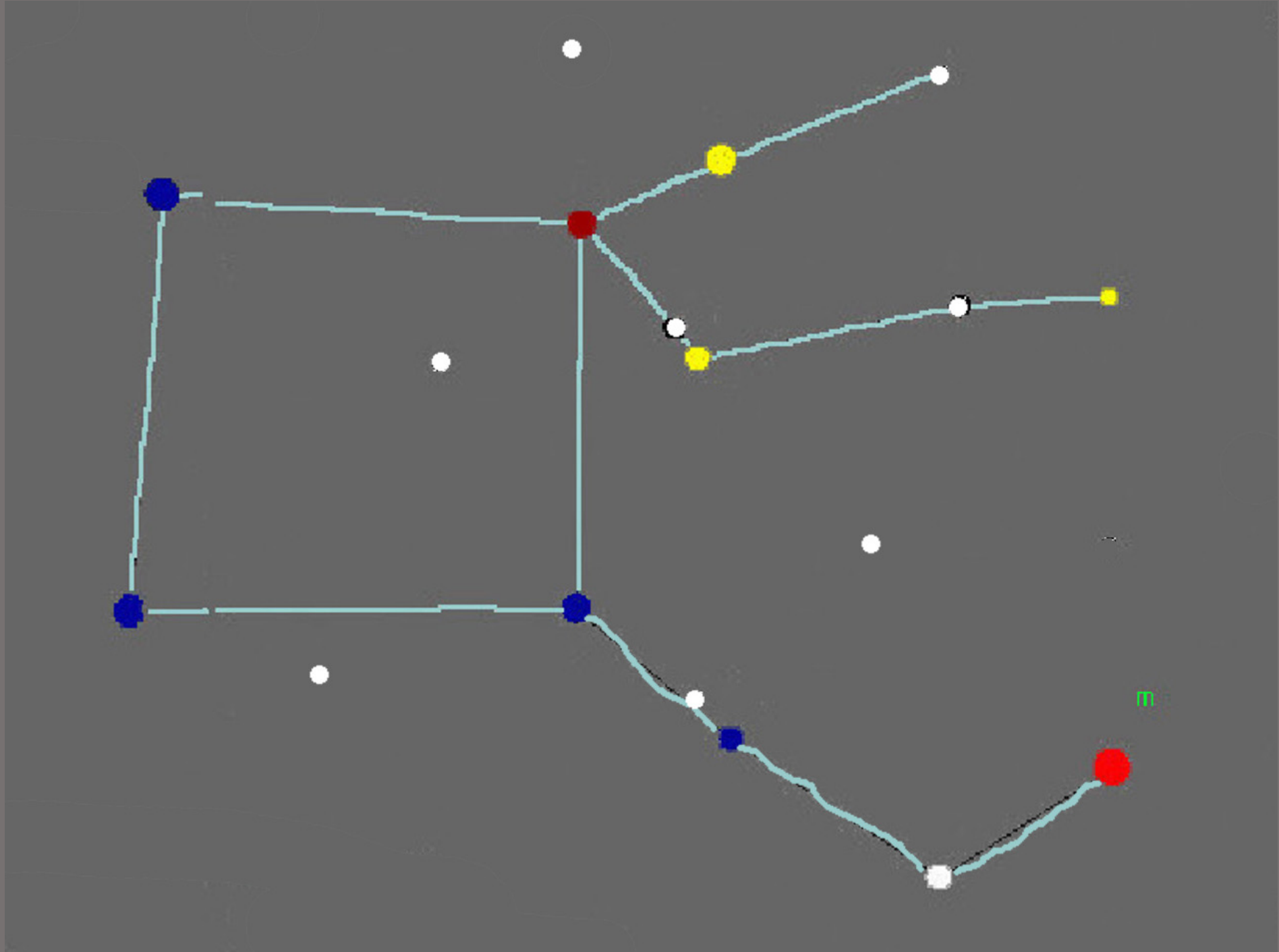
# PISCES

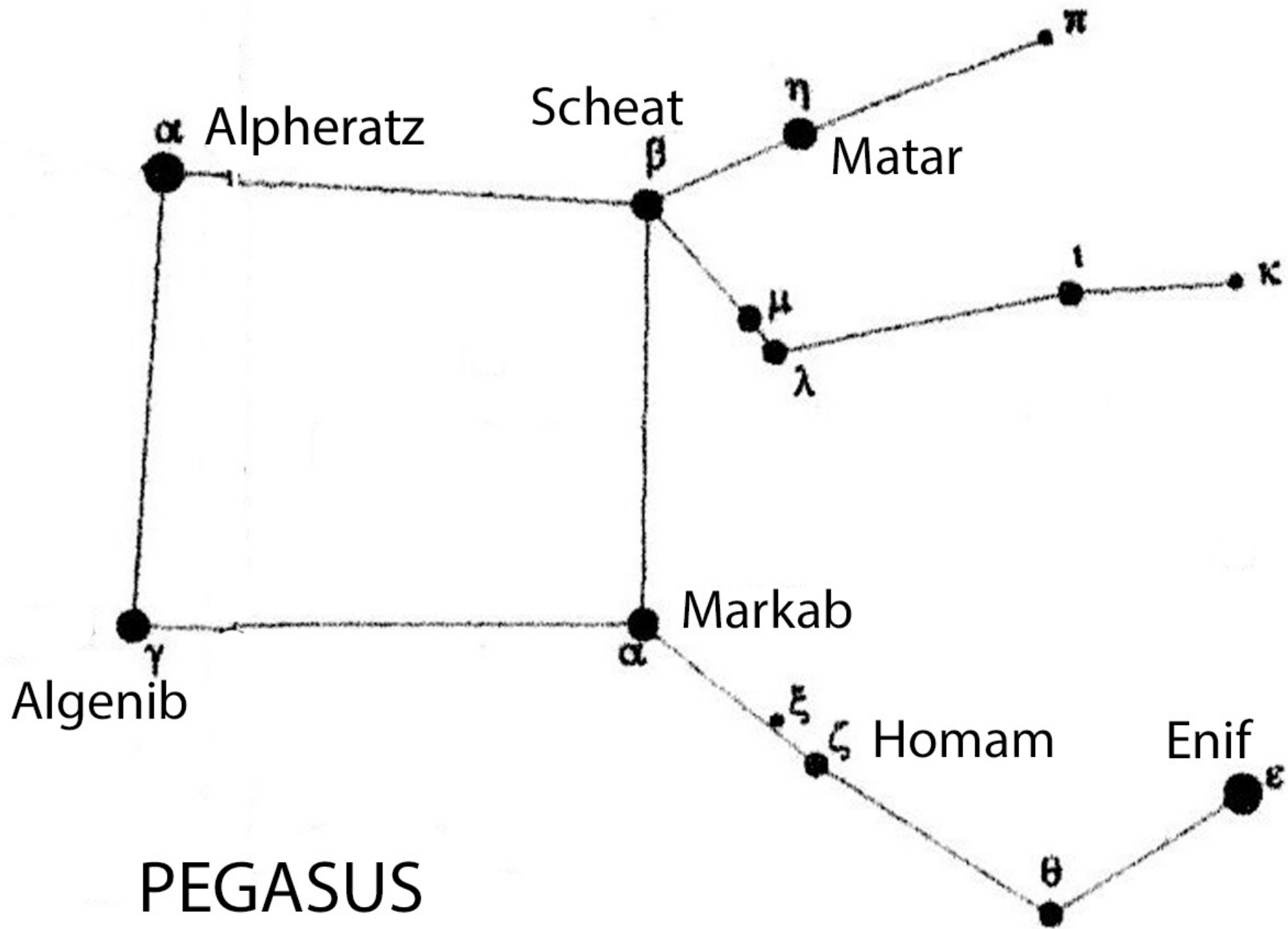


# CETUS









PEGASUS



Using Cepheid  
variable stars  
and  
Type 1a Supernovae  
To “prove”  
Hubble  
Expansion constant

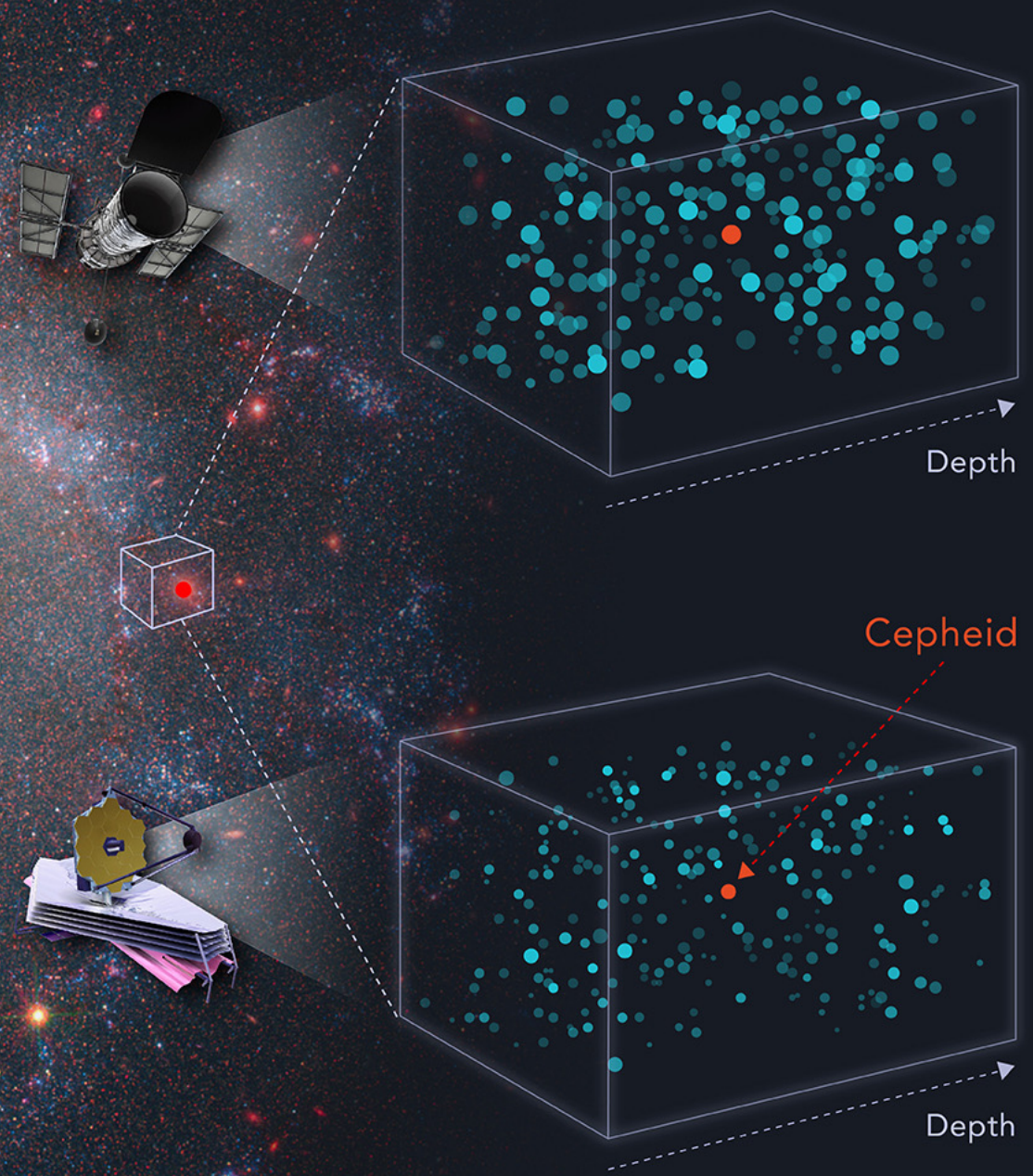


**Galaxy NGC 5585**  
**Hubble + JWST**

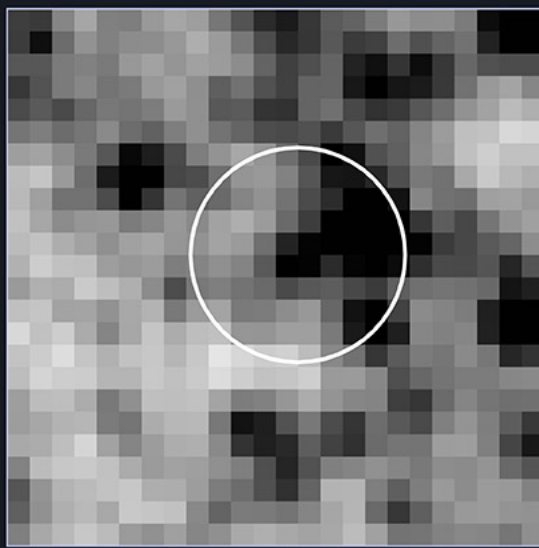




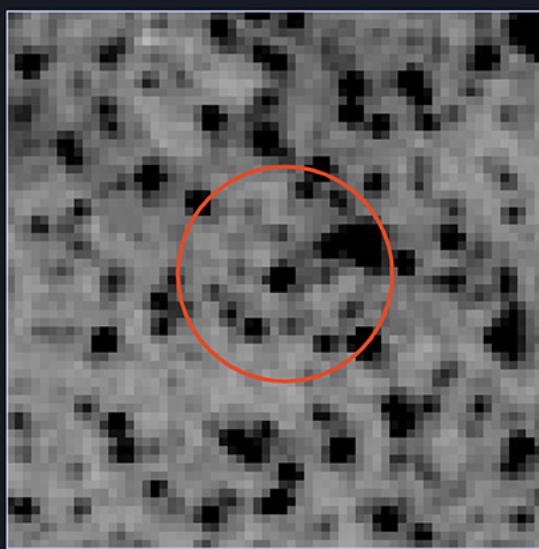
# UNCROWDING CEPHEIDS IN THE NEAR-INFRARED



HST WFC3-IR



JWST NIRCAM







# Vera Rubin Observatory

Dark Energy Camera  
Legacy Survey (DECaLS)



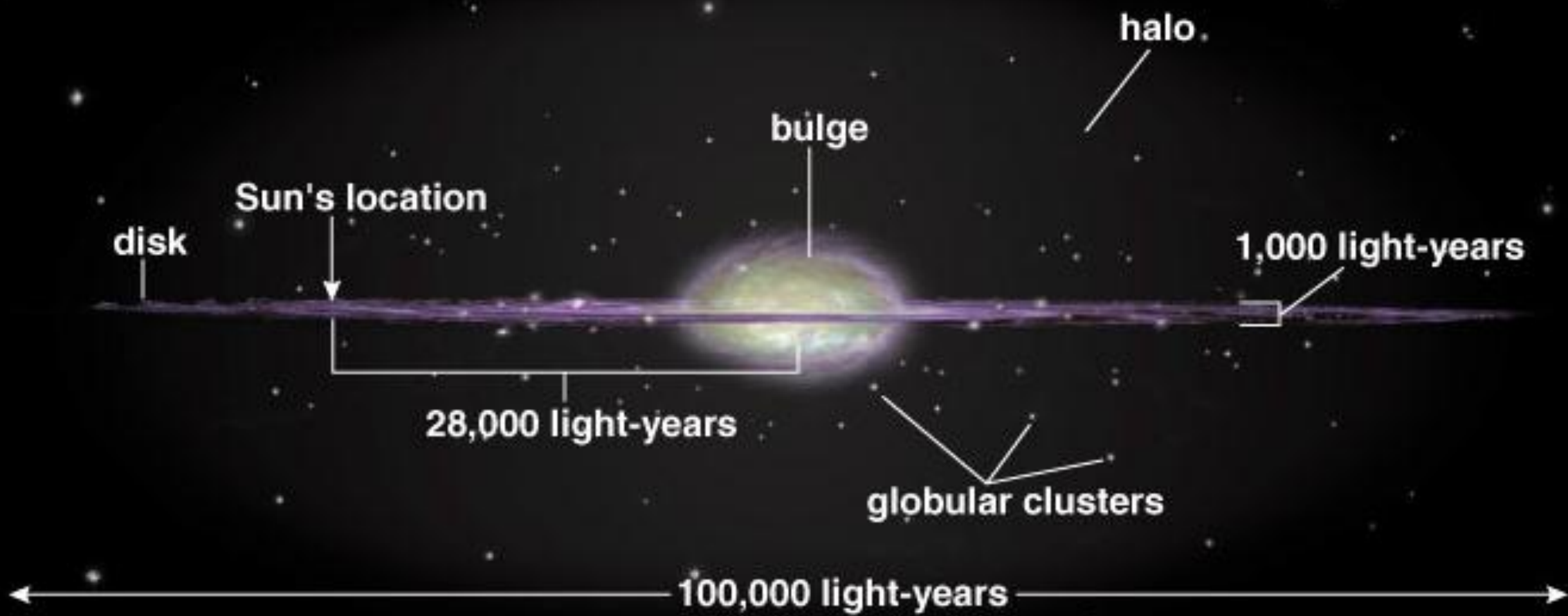
# Globular Clusters

Above the galactic “bulge” =

Halo G.C.

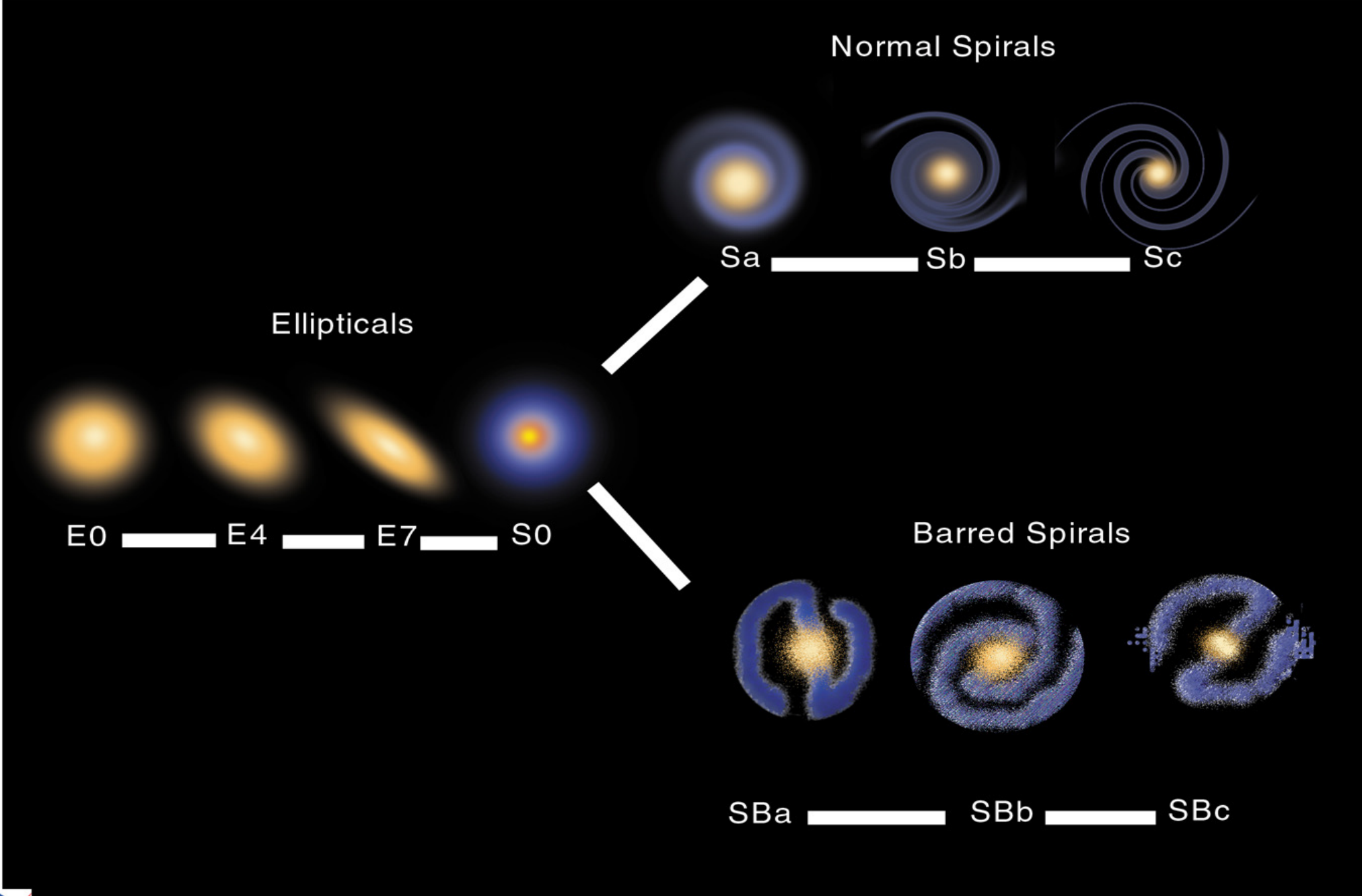
Imbedded in the bulge or galactic disk =

Galactic Bulge Fossils

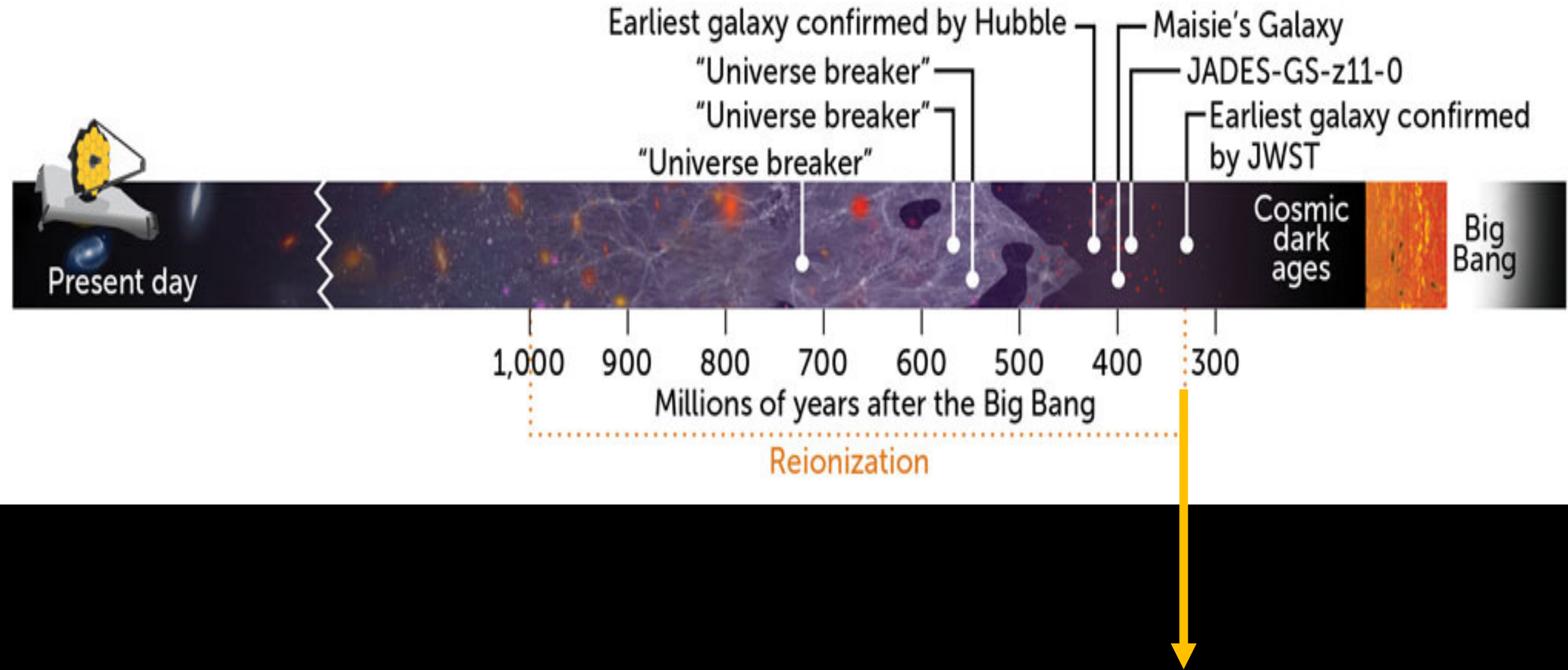


More  
On  
Galaxies





# Based on instrument data



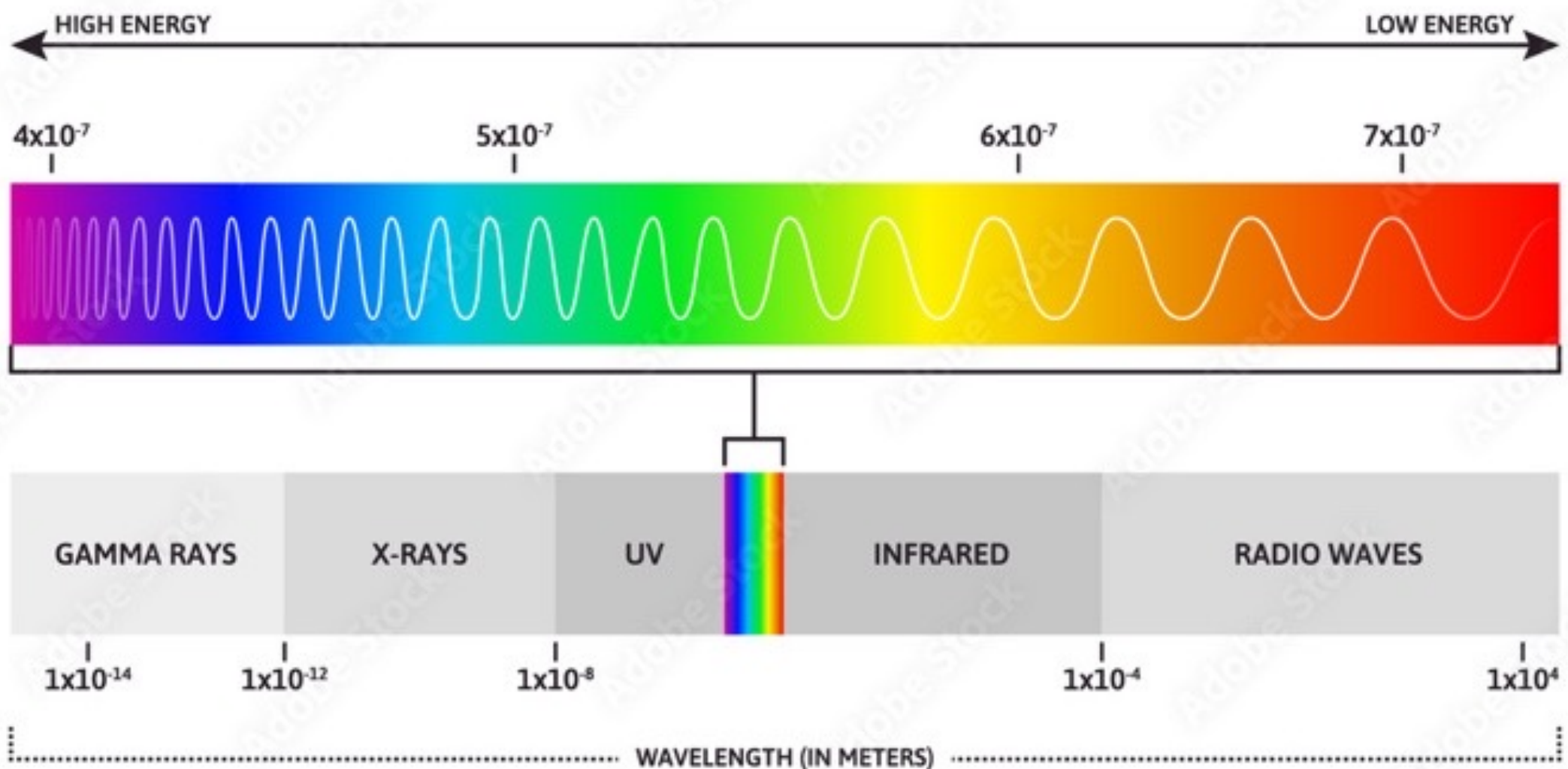


JWST  
Early  
Galaxies



# Spectroscopy Review

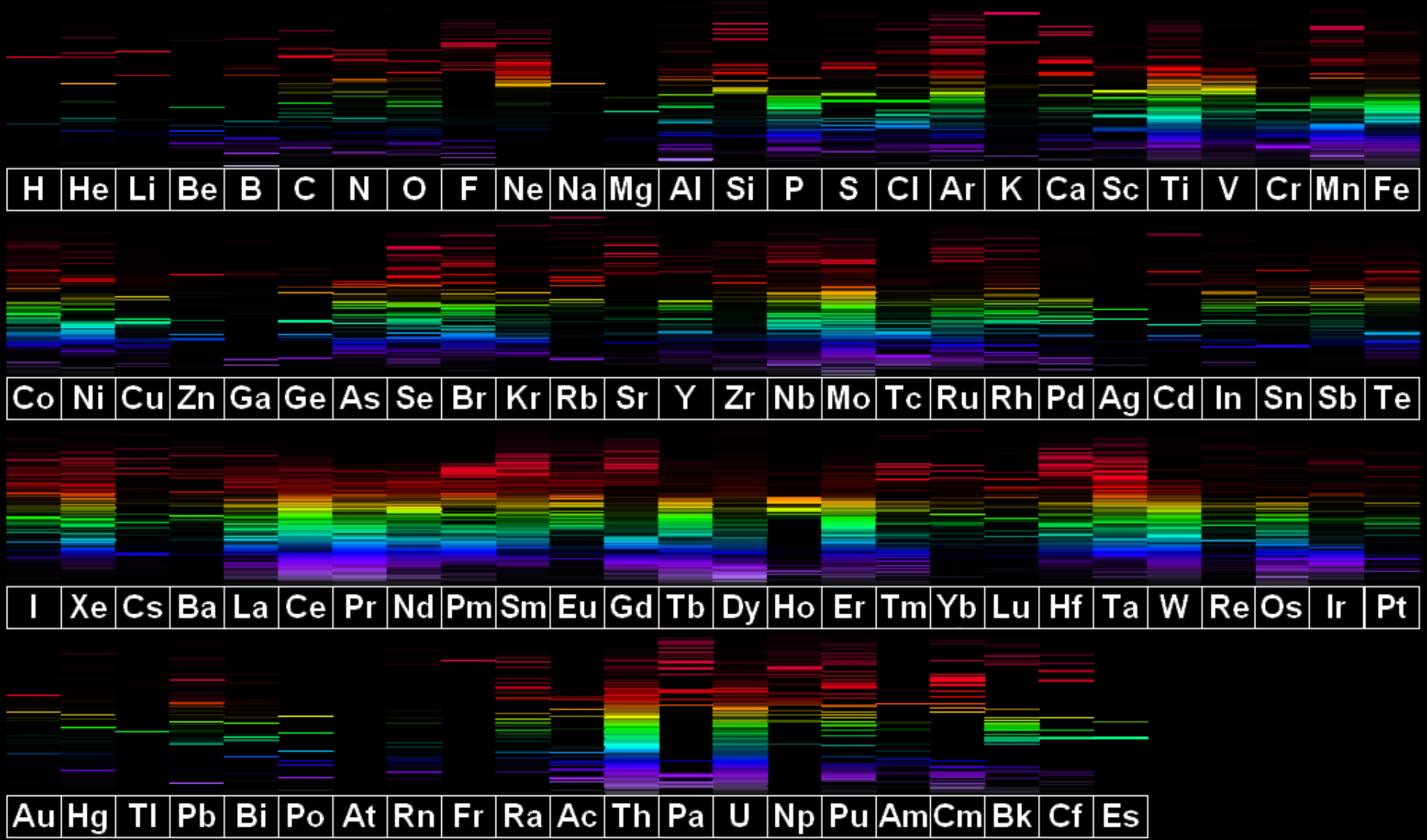
# VISIBLE SPECTRUM



Adobe Stock | #419575701

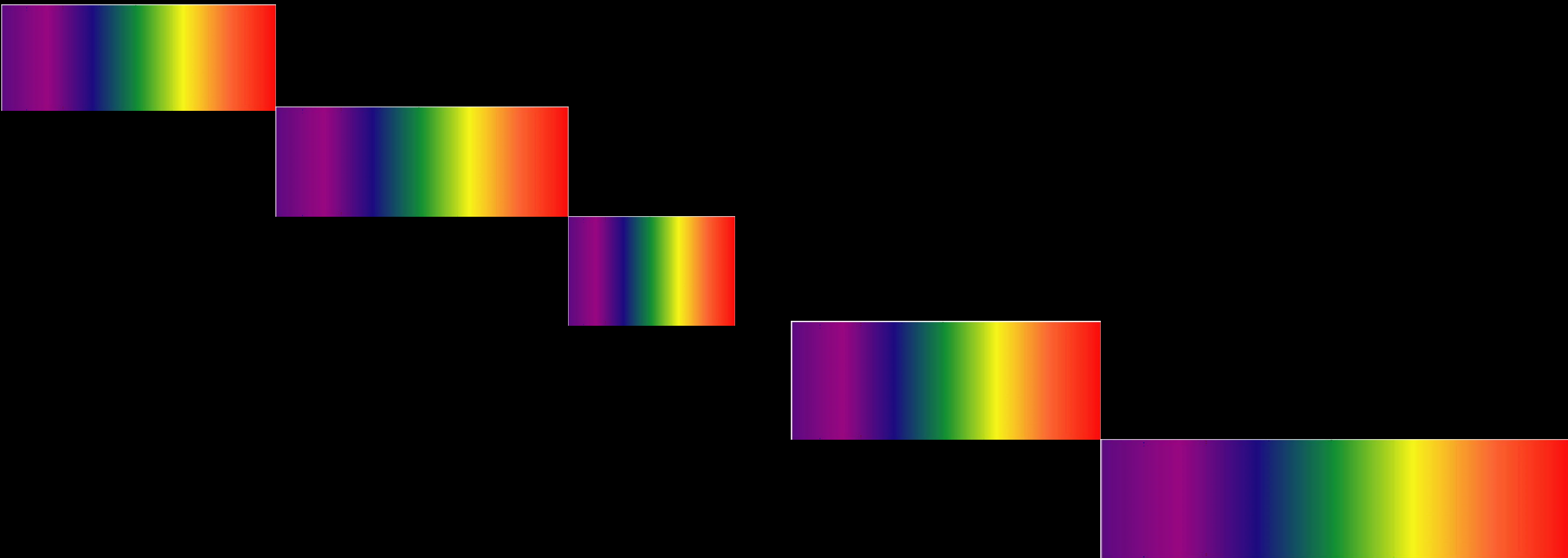






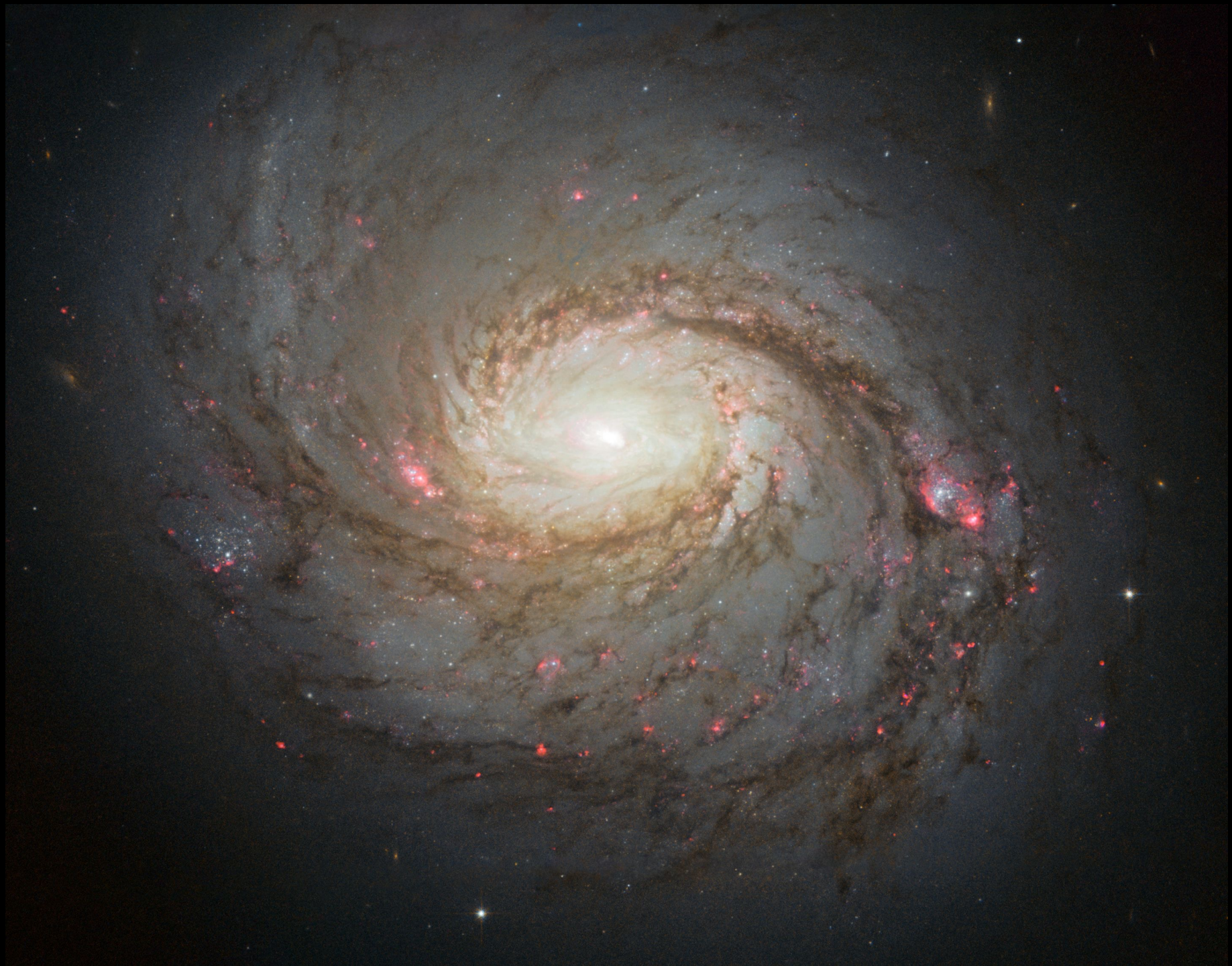


# Concept of False Coloring



SHORTER WAVELENGTHS

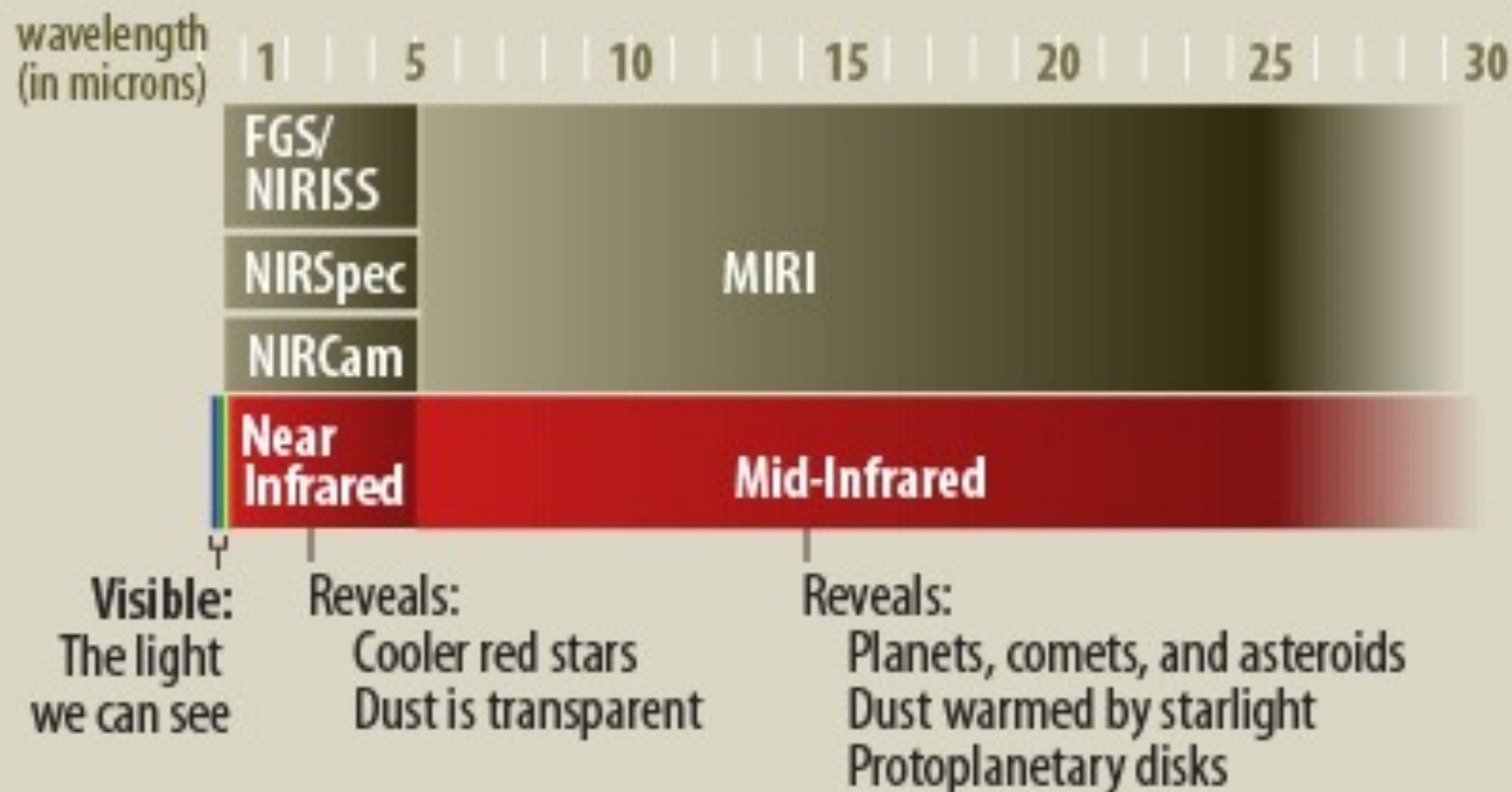
LONGER WAVELENGTHS



*Squid Galaxy*  
M 77  
AGN  
Seyfert Galaxy



# Infrared sensitivity of Webb's instruments



# Types of Galaxies



Barred Spiral



Irregular



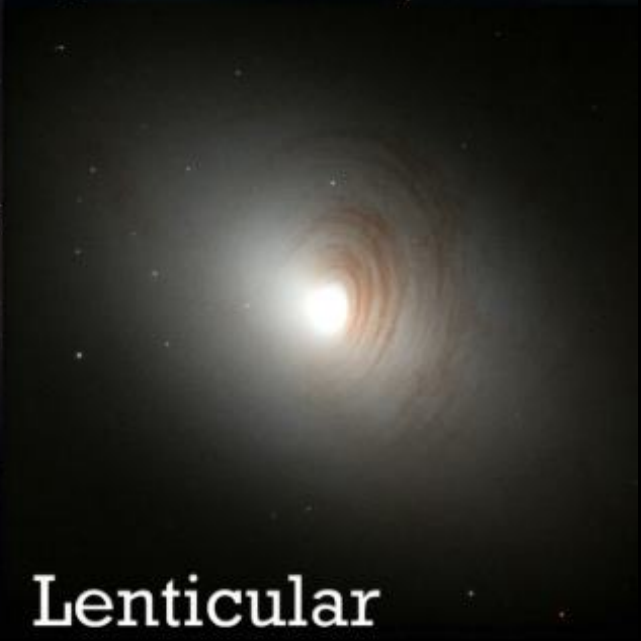
Spiral



Peculiar



Elliptical



Lenticular

Illustration Credit:  
Astronomy - SPGN

[facebook.com/AstronomyStarsPlanetsGalaxiesNebulae](https://www.facebook.com/AstronomyStarsPlanetsGalaxiesNebulae)

**Scorpion Galaxy**

**NGC 3165**

**AGN**

**Lenticular class**



# SEYFERT TYPE GALAXIES

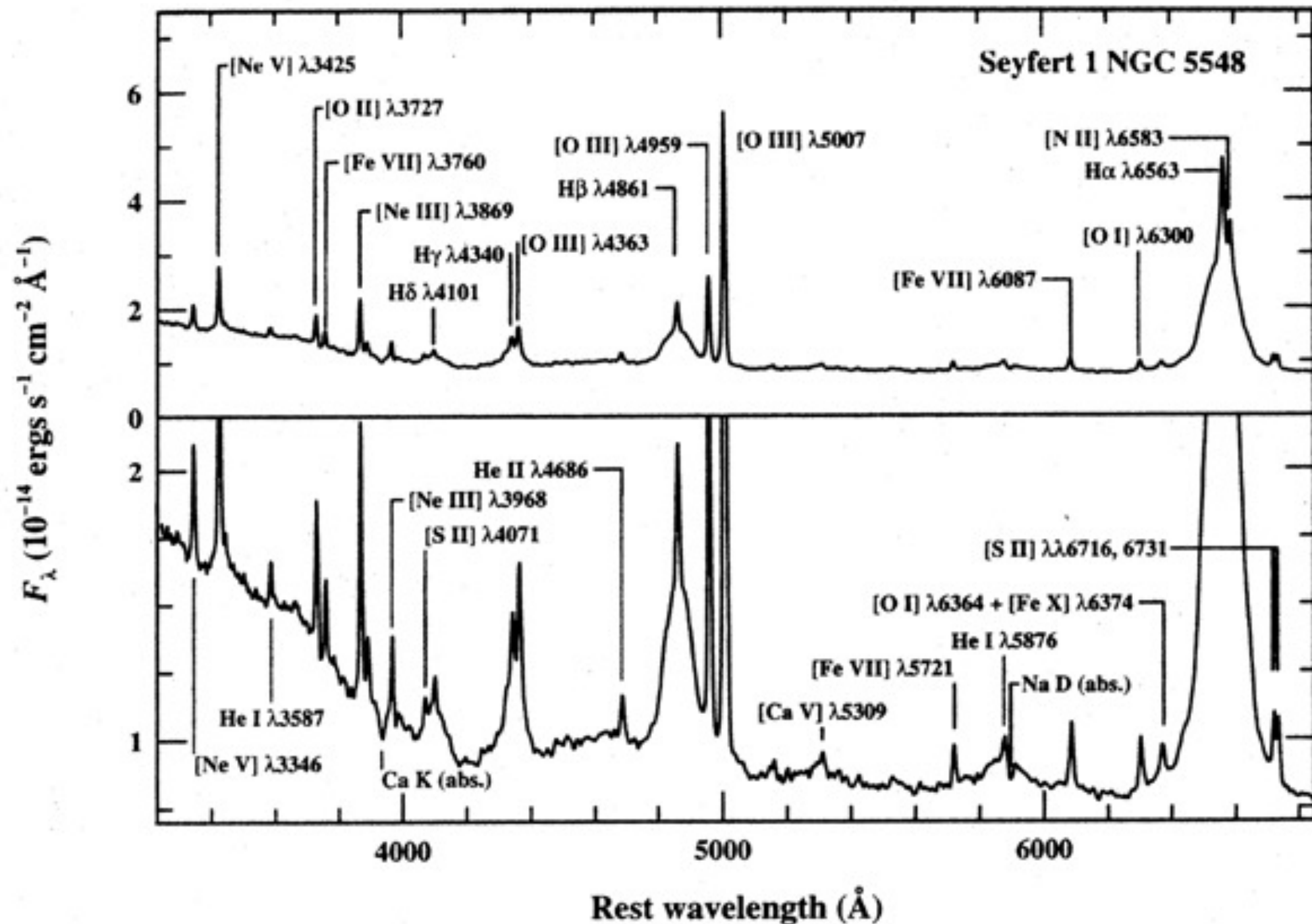
Strong Emission lines

Usually Spiral class

Star-like center (AGN)

Bright in the infrared

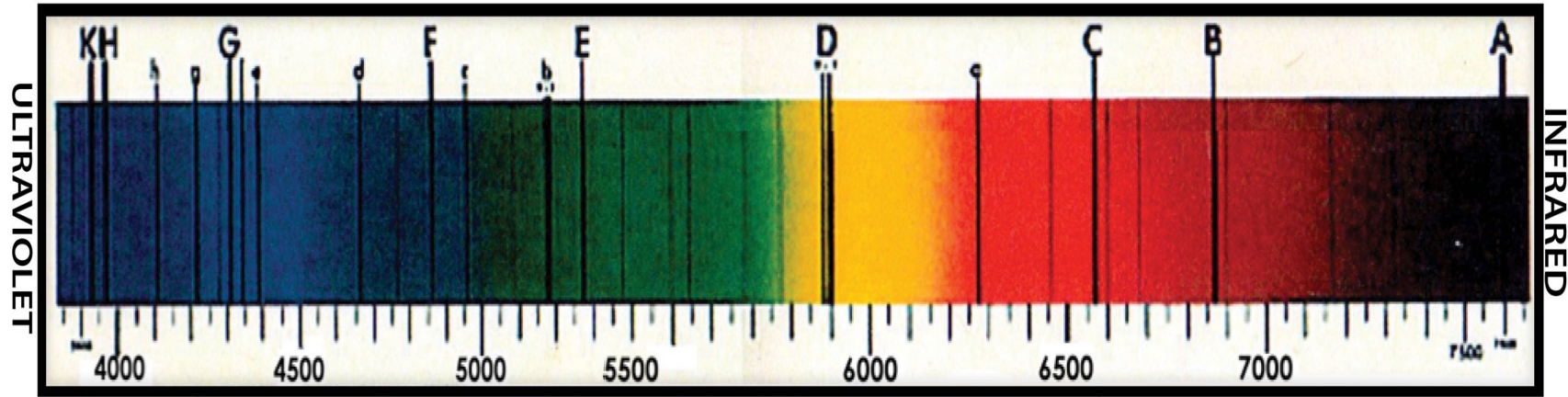






# Solar Filters - It's All About Wavelength!

Visible spectrum of our Sun



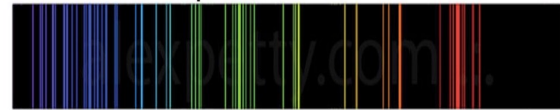
## Calcium II K

This filter passes near ultraviolet light emitted by the calcium in the chromosphere

Calcium Absorption Spectrum



Calcium Emission Spectrum



## Hydrogen-alpha (H-a)

This filter passes near infrared light emitted by hydrogen in the chromosphere

Hydrogen Absorption Spectrum



Hydrogen Emission Spectrum







**Galaxy**  
**NGC 1097**

**Spiral**  
**Barred Spiral**  
**AGN**  
**Seyfert type**

# QUASARS

Strong radio sources

A non-star-like spectra

(H-beta, gamma, delta)

Accretion disk UV emission

Far Away

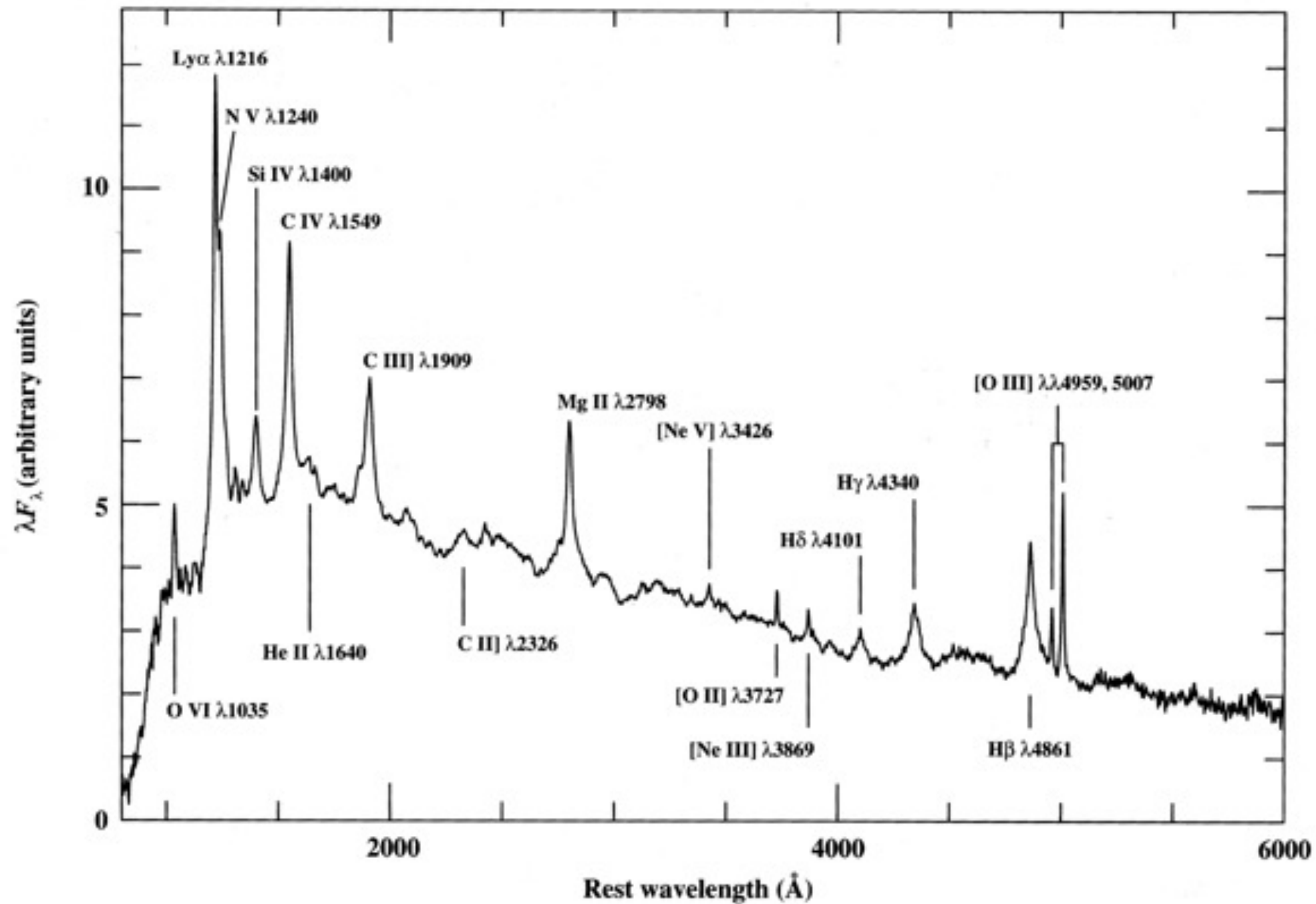
Bright nuclei





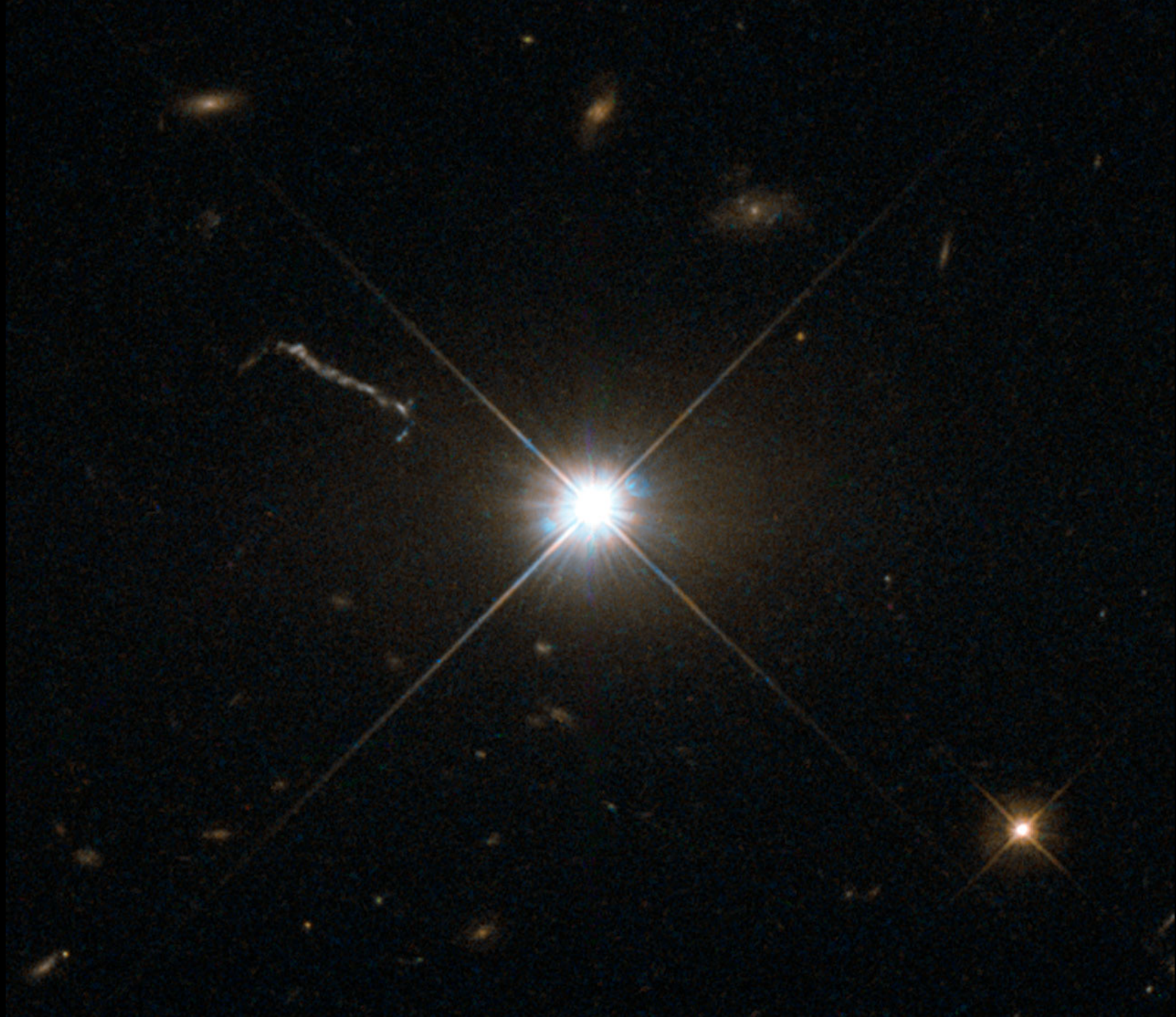
**Galaxy  
Z229-15**

**Spiral  
Barred Spiral  
AGN  
Quasar  
Seyfert type**





Quasar  
3C 273  
Hubble  
Wide Field





Quasar  
3C 273  
Hubble Wide  
Field  
Coronagraph

