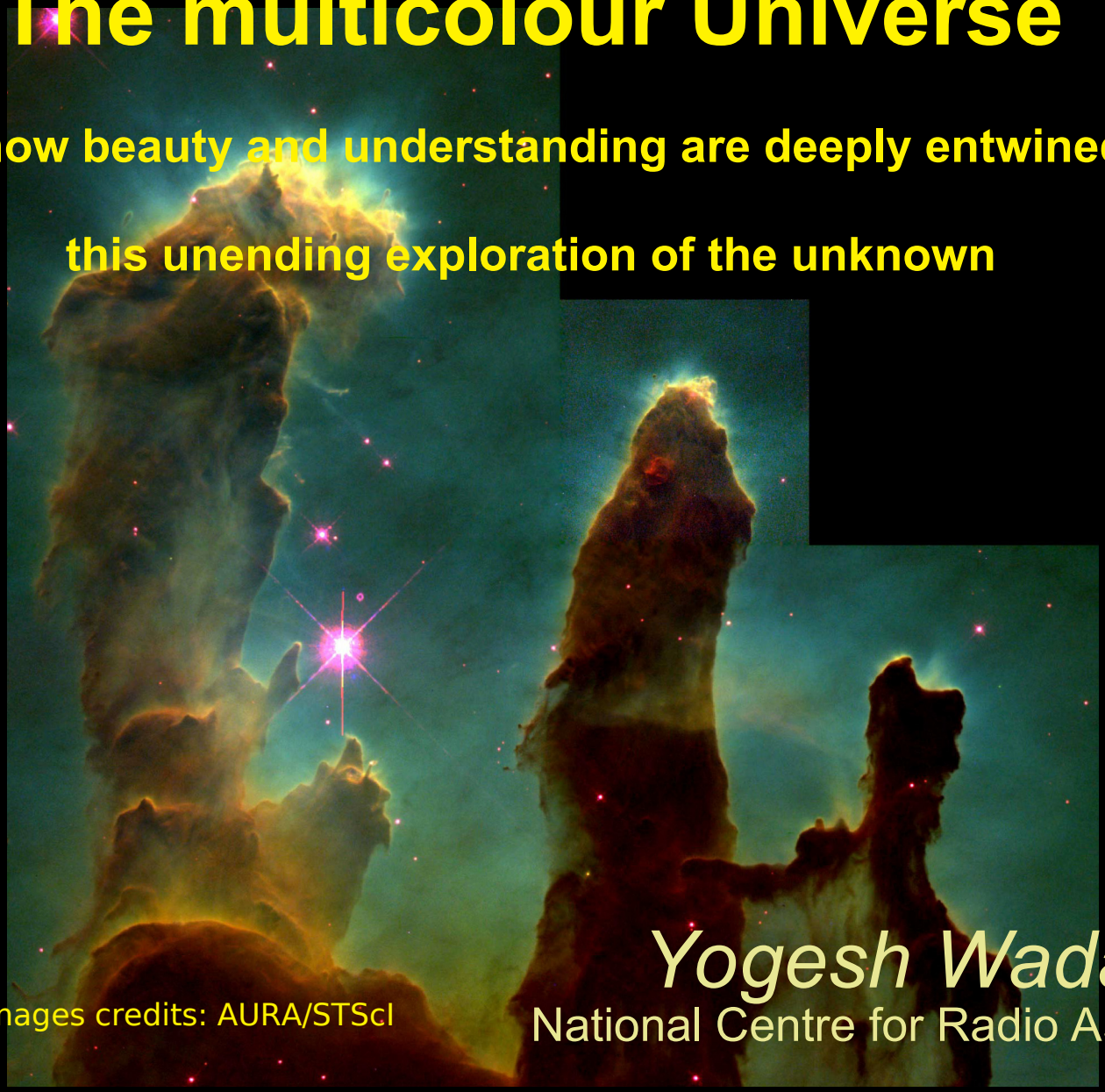
The multicolour Universe

and how beauty and understanding are deeply entwined in

this unending exploration of the unknown

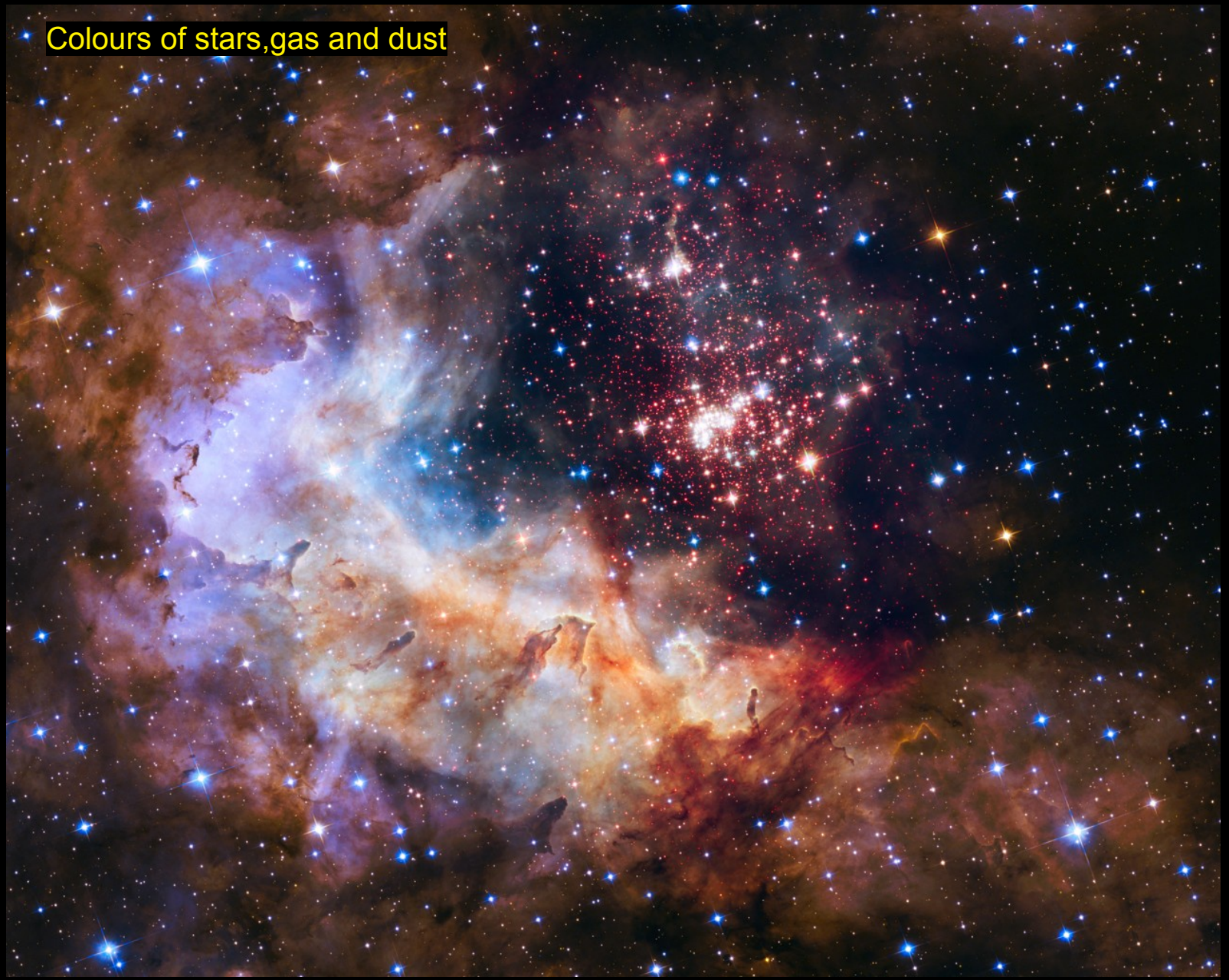


Most images credits: AURA/STScI

Yogesh Wadadekar
National Centre for Radio Astrophysics

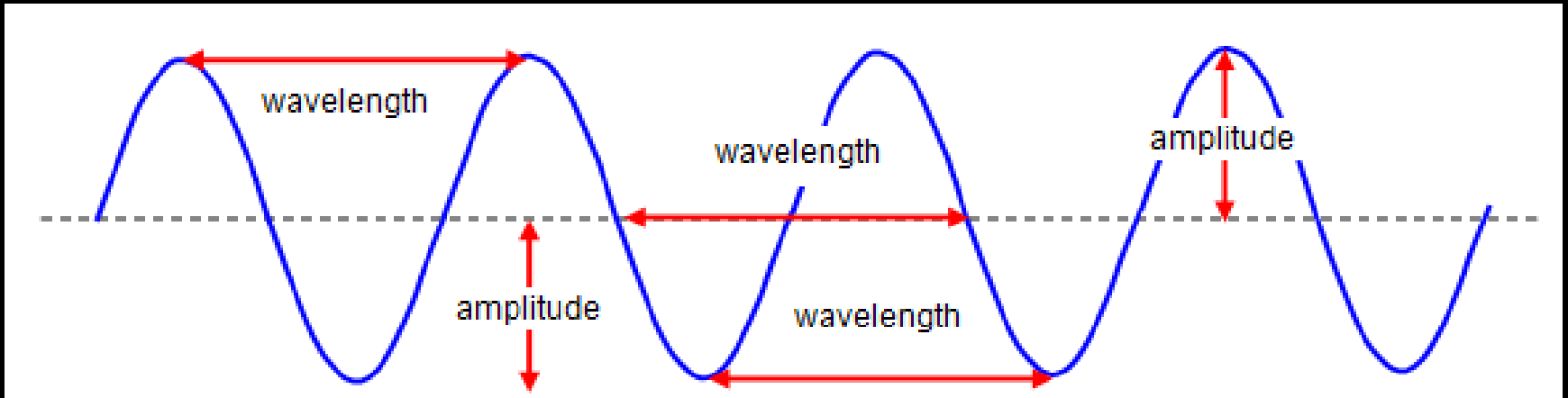
World’s largest low frequency radio telescope


Hubble space telescope in near-Earth Orbit


Colours of stars,gas and dust

What exactly is colour?

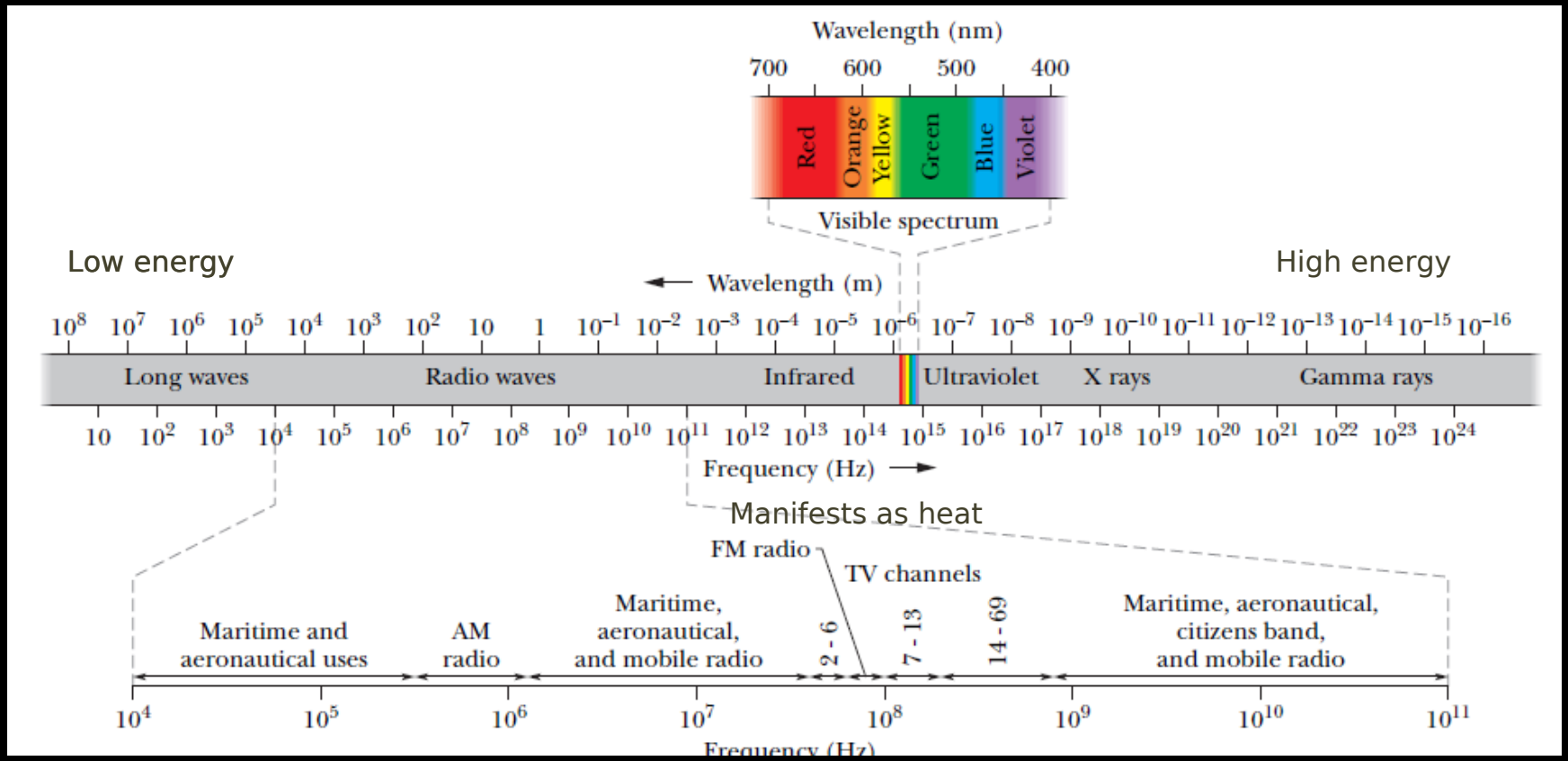
Light is a transverse wave



Light speed is 3 lakh kilometers per second, can circle the earth nearly 8 times in one second!

Wavelength of light defines its colour

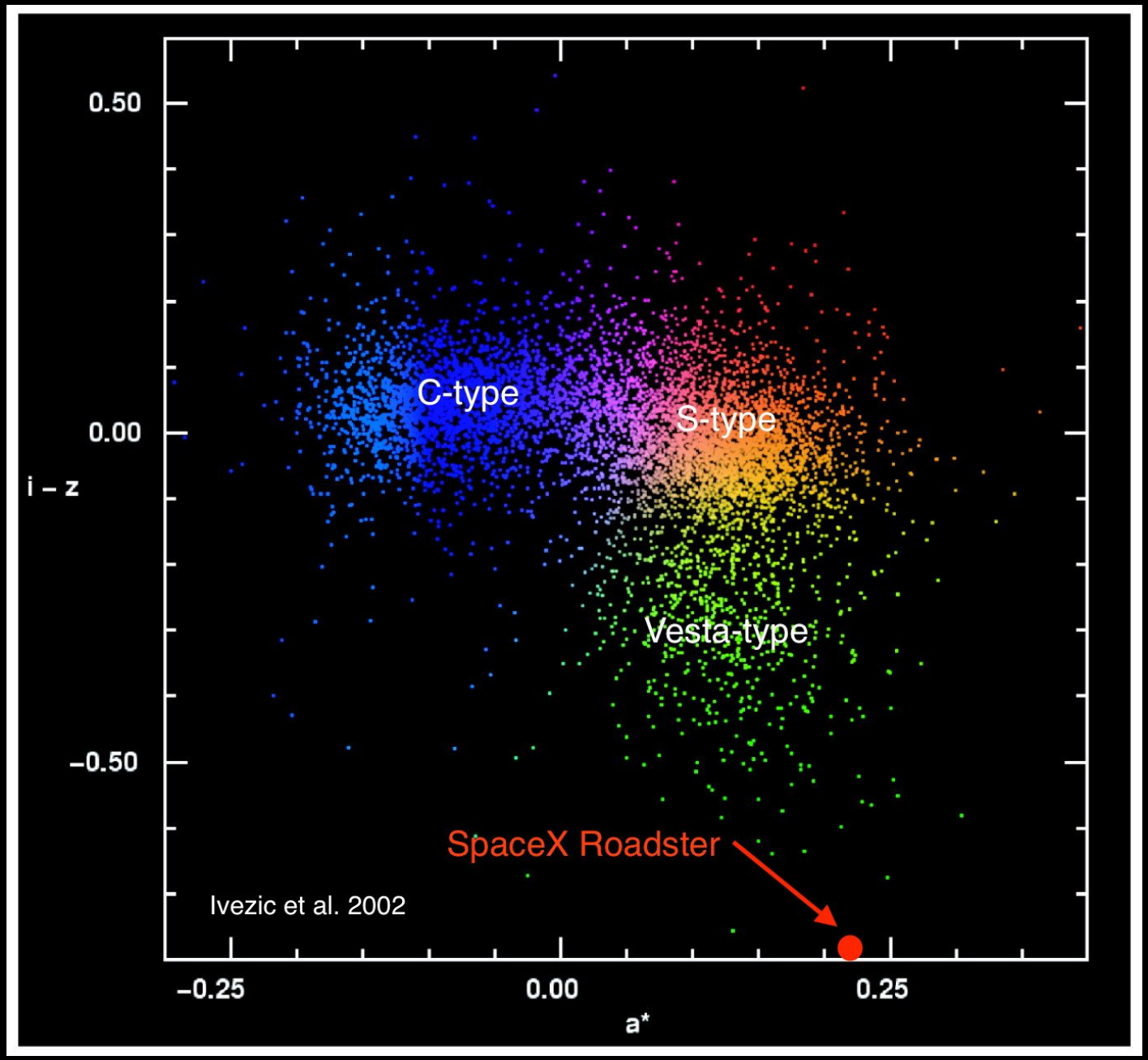
The spectrum of light



What are the sources of light in this room?

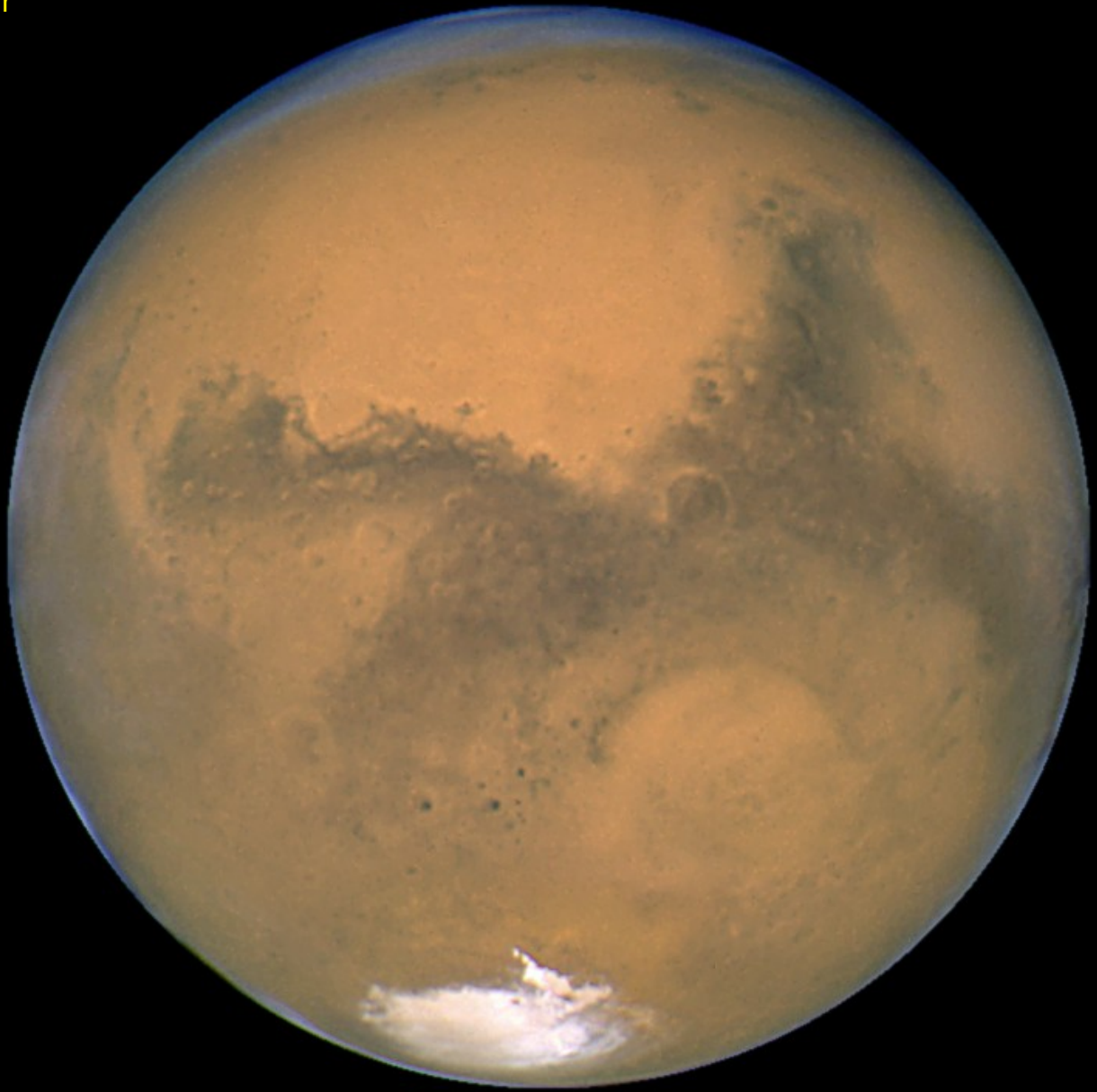
Each one of us is a source of light. Even the air in this room is glowing in infrared.
Cell phones are a source of radio light. We are all immersed in a sea of light.

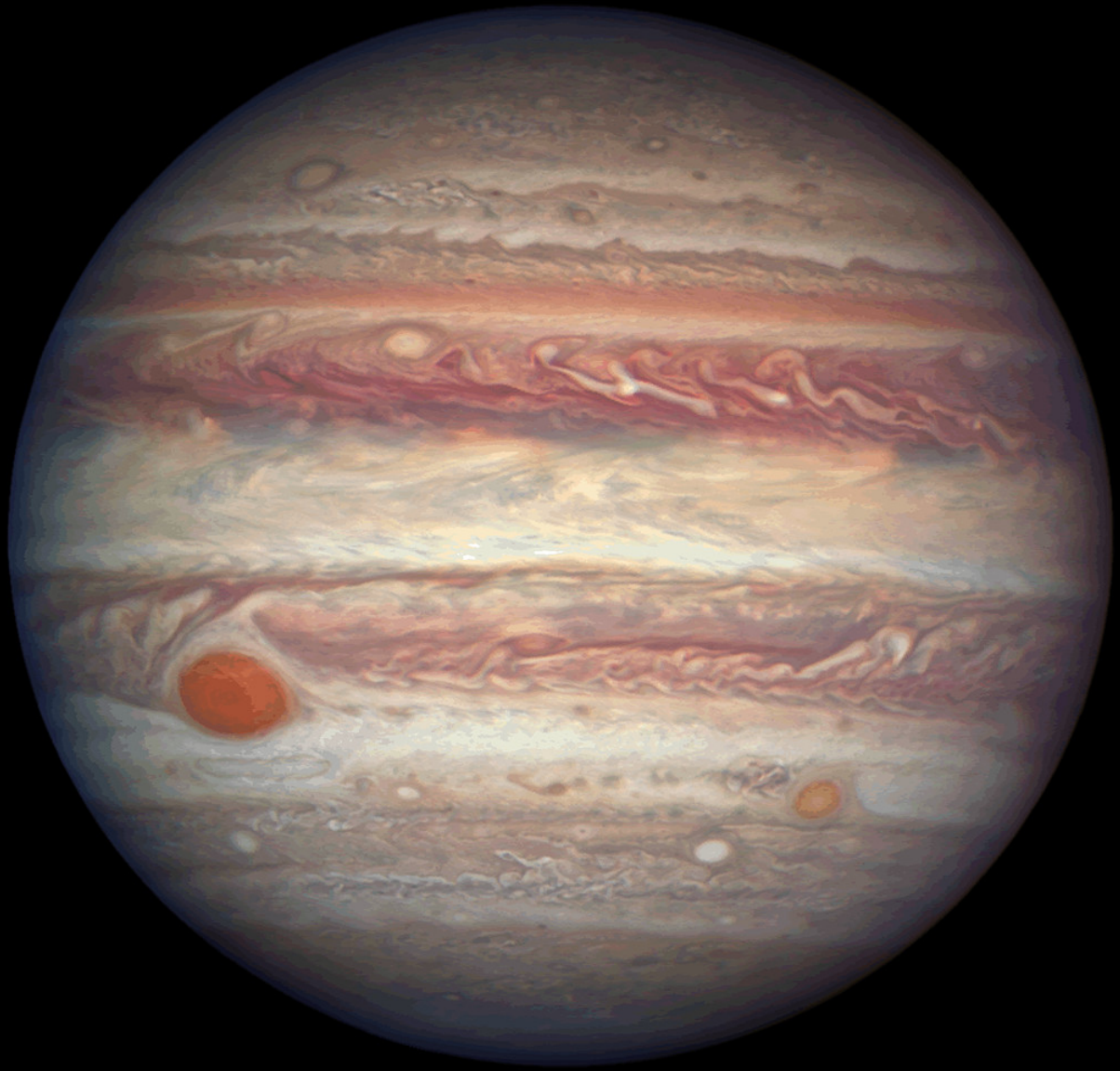
Red Coloured Cars in space


0.50
0.00
−0.50
i – z
C-type
S-type
Vesta-type
SpaceX Roadster
Ivezic et al. 2002
−0.25
0.00
0.25
a*

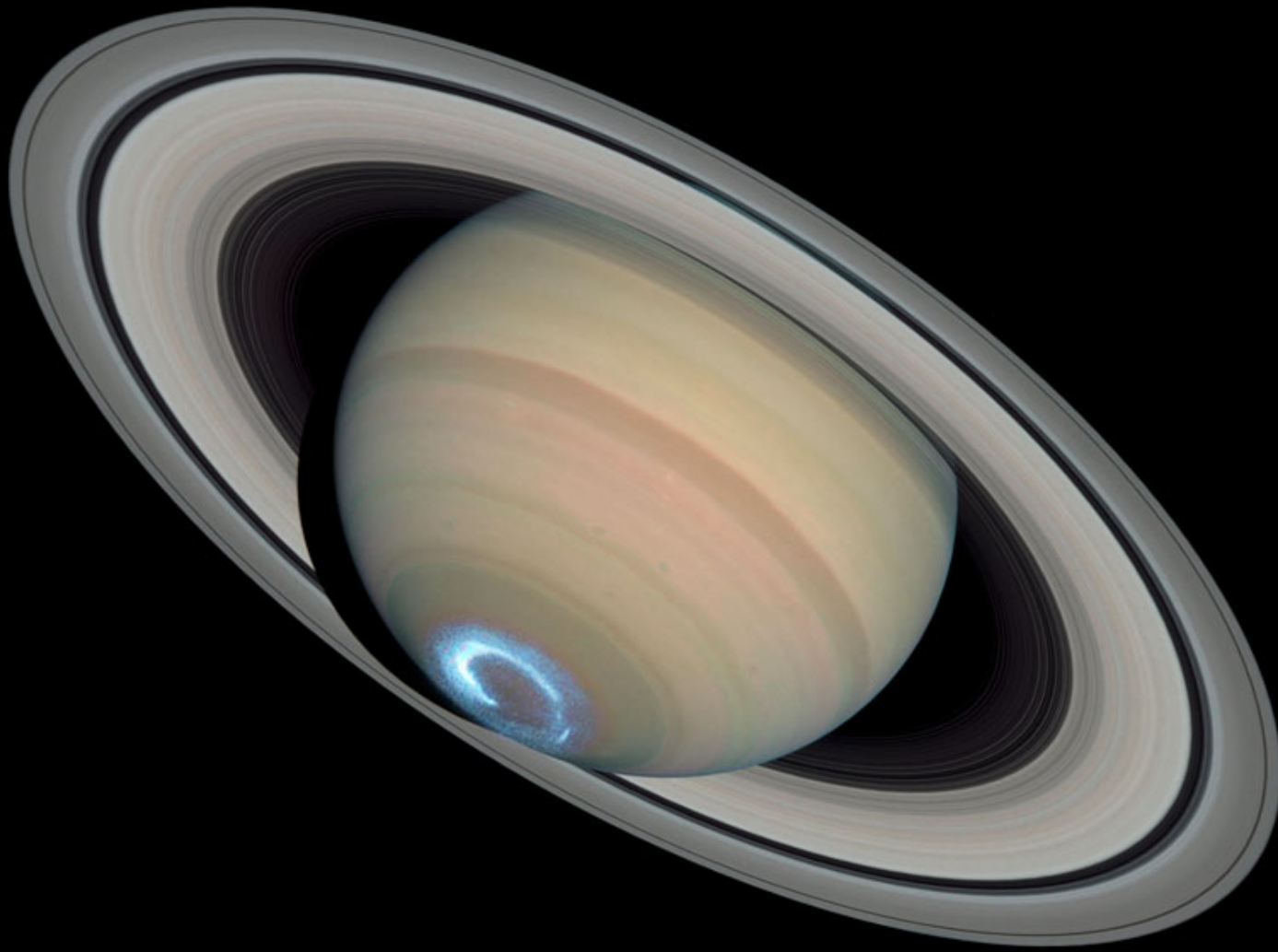
Planets in Colour

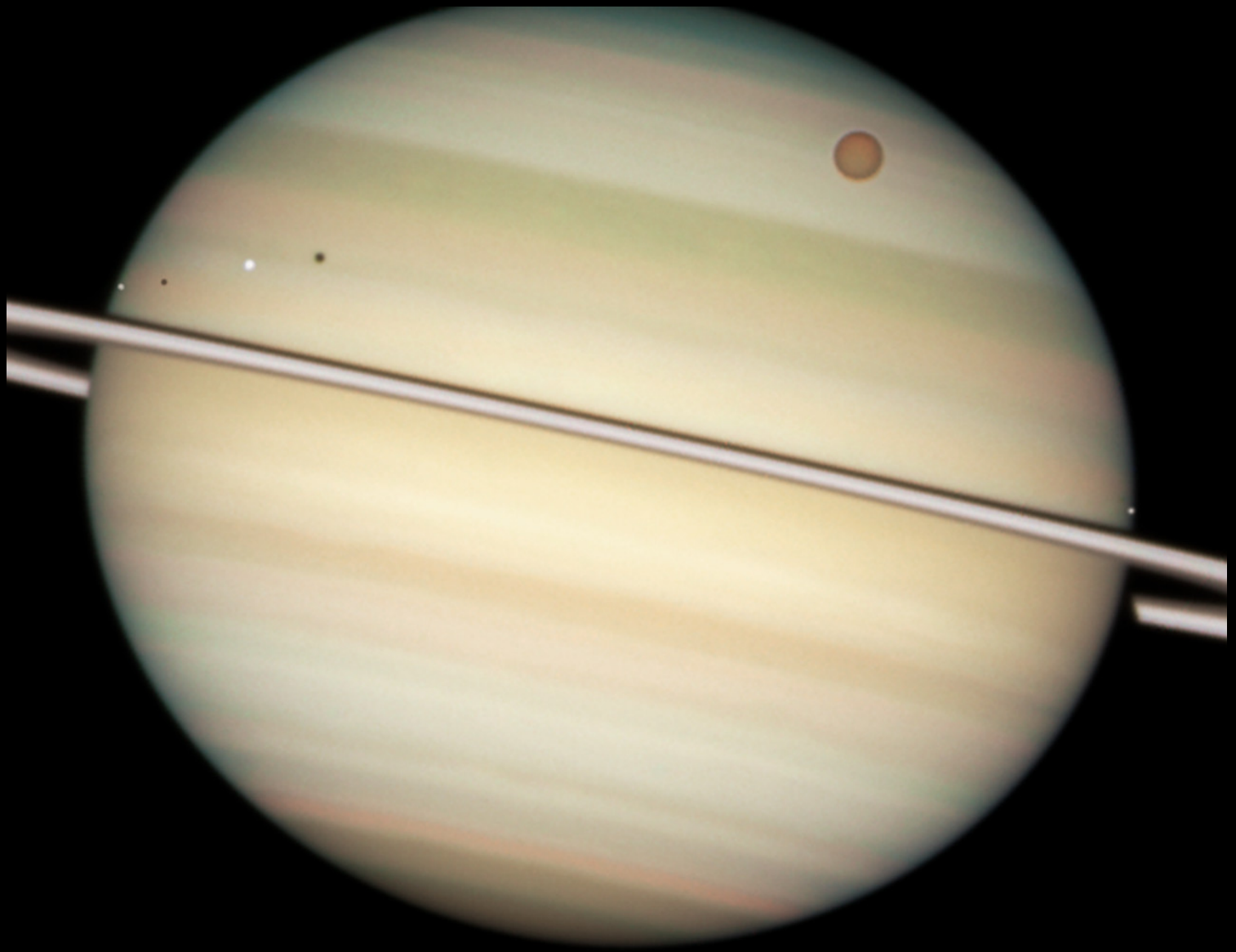
Why is Mars reddish?
Subtractive colour

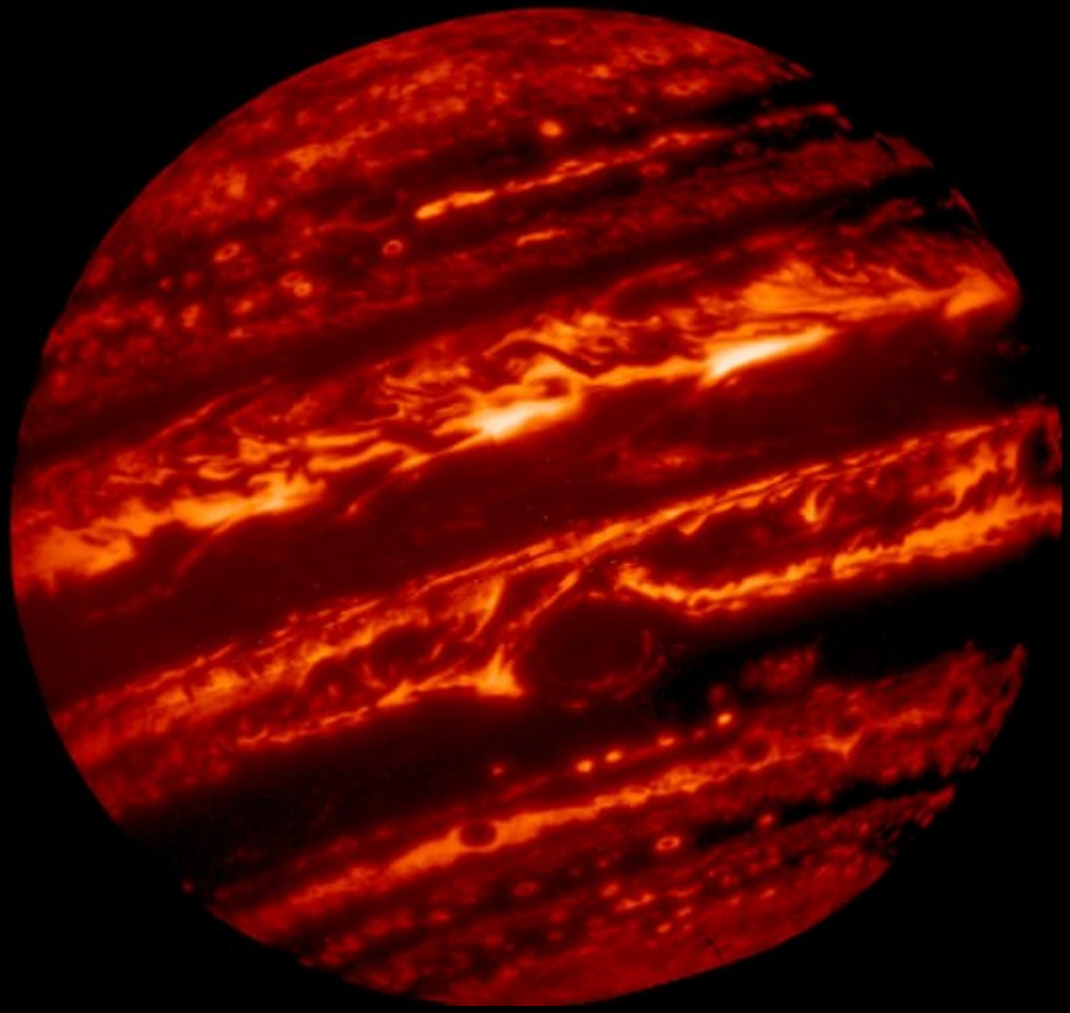




Aurorae glow bright in UV







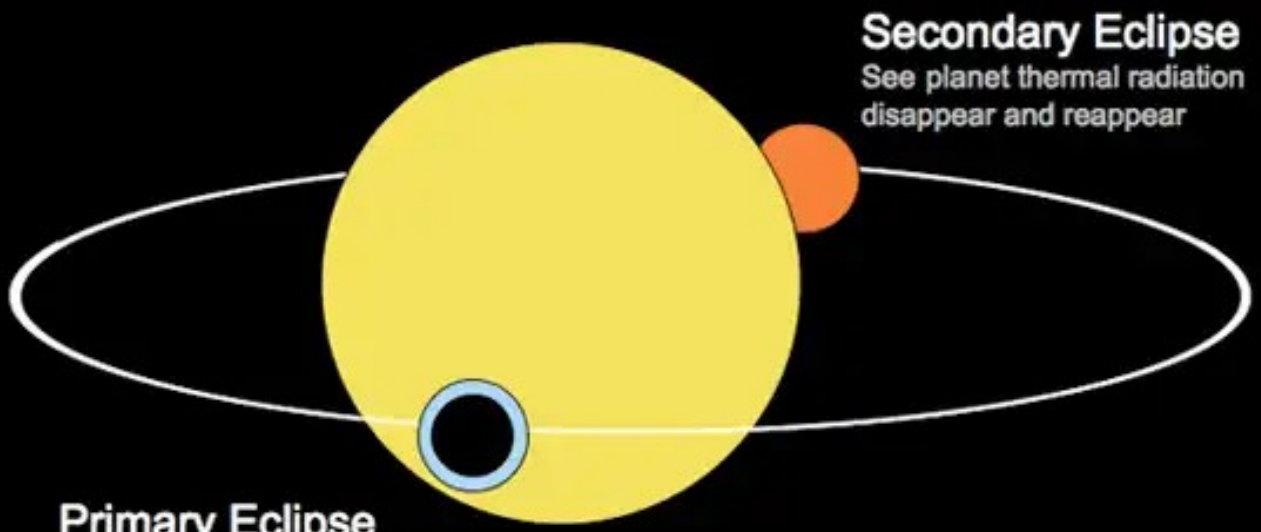
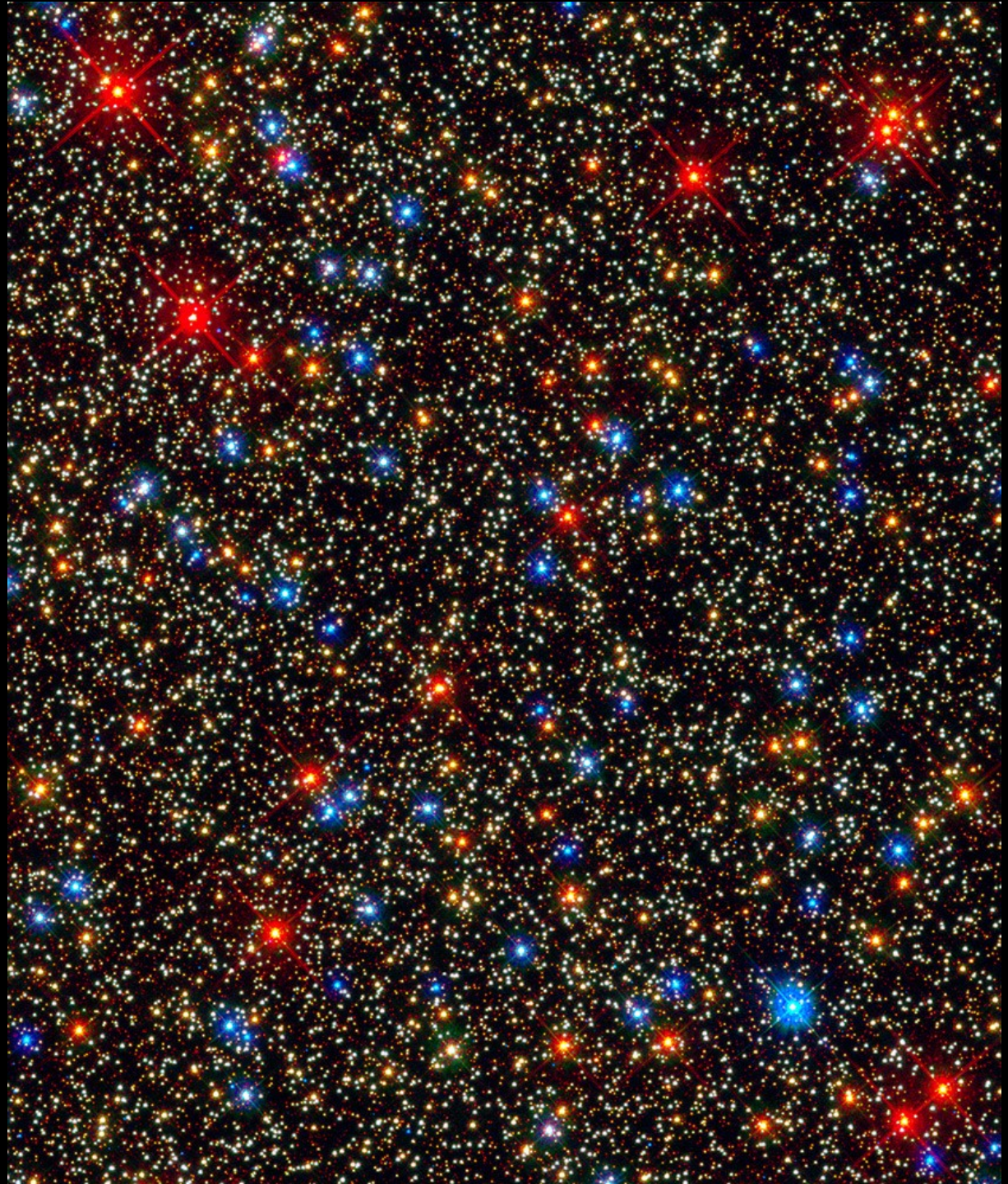
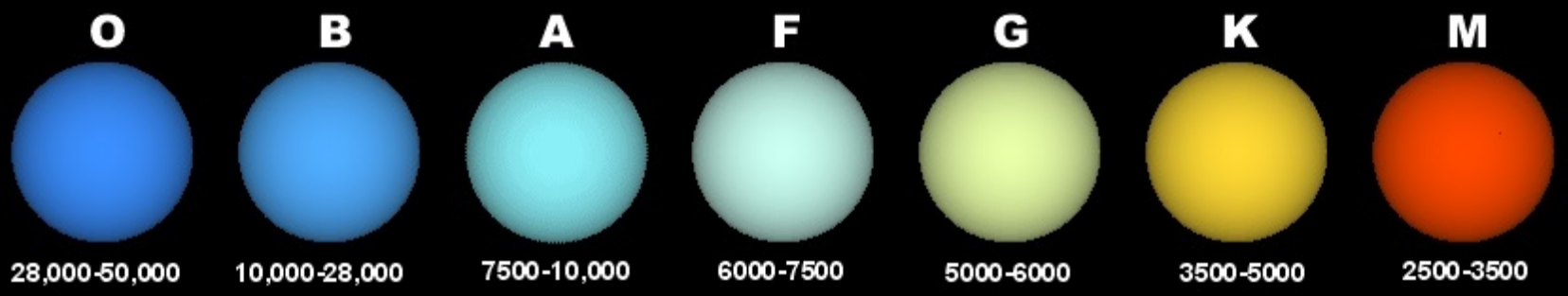


Figure by S. Seager

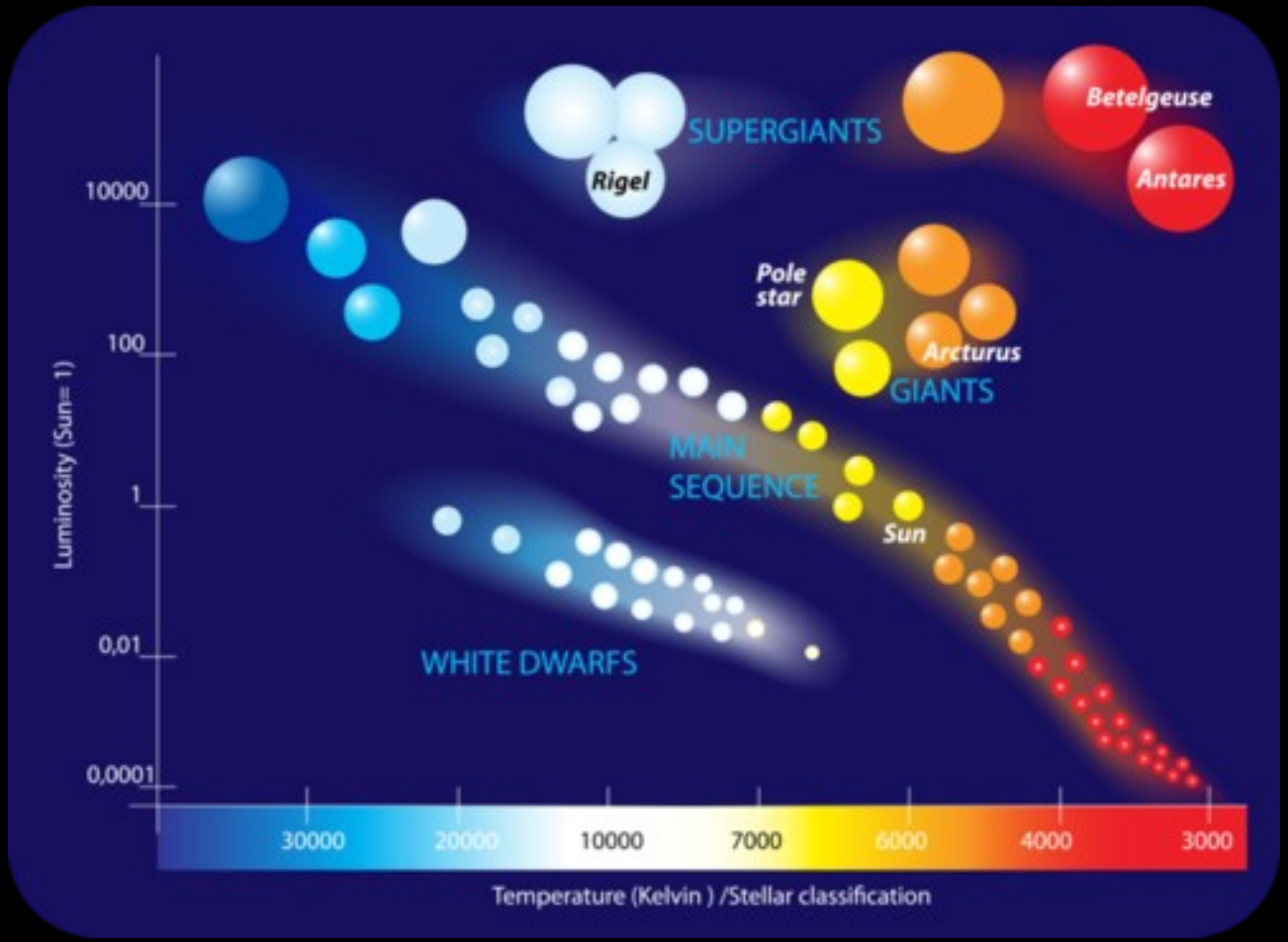
The Colours of Stars





Surface Temperature of stars depends on their colour

How Astronomers understand stars by colour and luminosity




NGC 3603, blue stars are <1 million years old, they are very bright now but they will die quickly

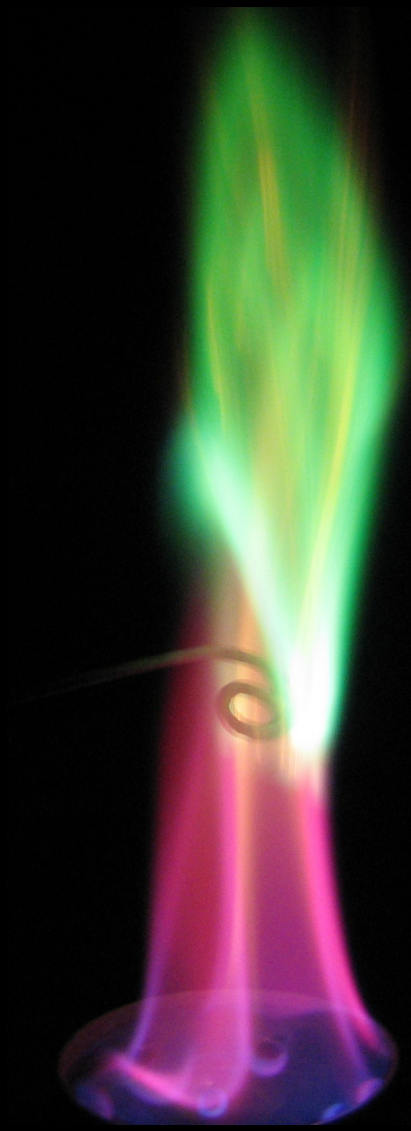

N90, star forming region


Bubble nebula; colour tells us about the physical condition of the gas

When a star dies – a planetary nebula is born


Here colour comes from different ionic emission lines

Copper Chloride flame



Infrared helps us peer through the darkness caused by dust

In galaxies, colour tells us where stars are being born and where the older stars live

NGC 2481 Only old stars near the centre and young blue stars in thousands of little star forming regions in the outer parts.

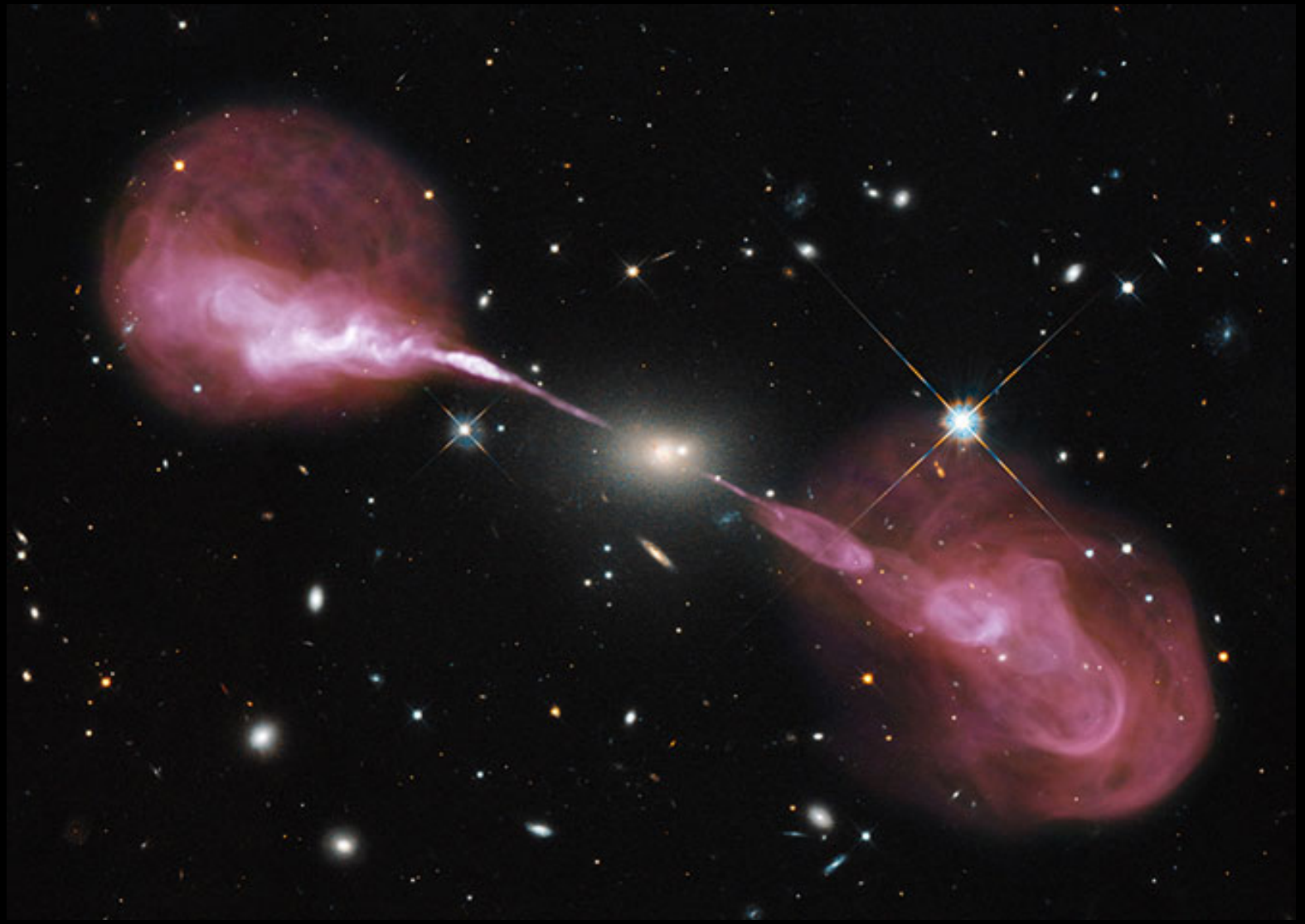
Stephan’s Quintet

There’s a supermassive black hole at the centre of every galaxy

Artist impression of AGN

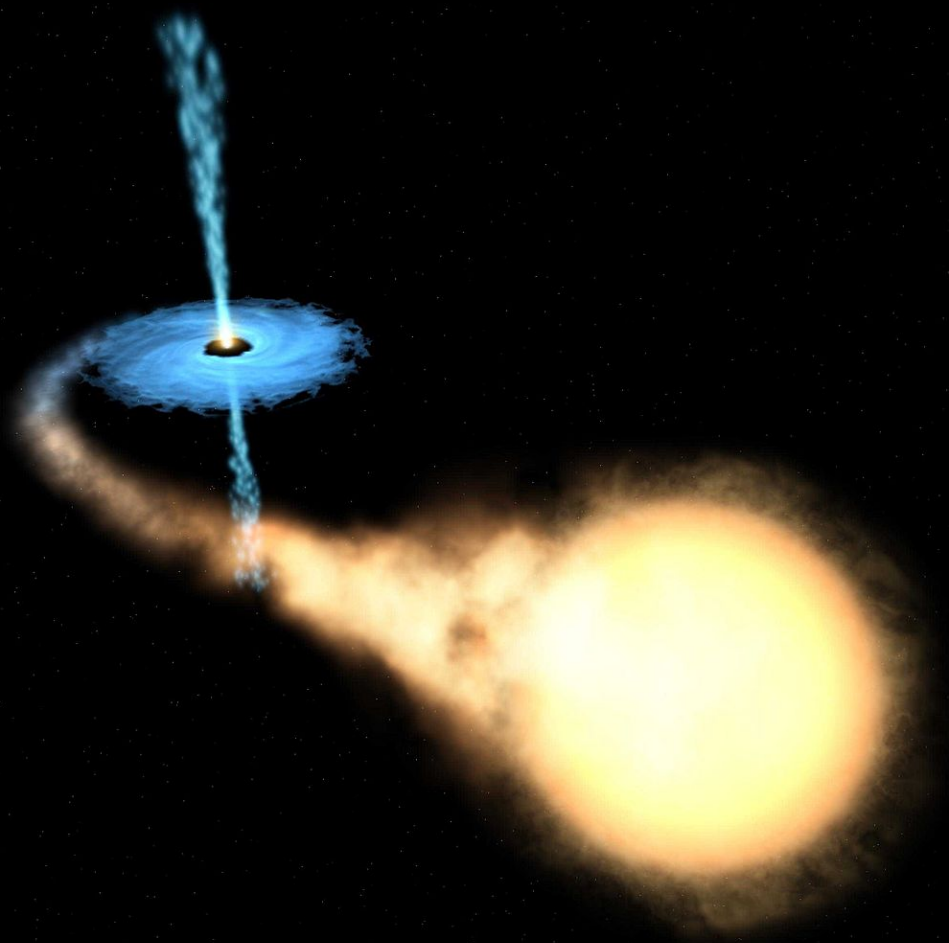
Artist impression of a supermassive black hole

Jets streaming out from the supermassive black hole glow brightly in radio light.
Can be millions of light years from end to end. This is an image of Hercules A



Hanny’s Voorwerp, IC 2497

X-ray binary




Chandra X-ray


Hubble Optical


Spitzer Infrared

Low mass X-ray binaries are not seen in the optical


Gravity bends light but all colours bend the same way. But often, it also magnifies the light of the background galaxy


GN-z11 13.39 billion light years away. It's color is a clue to its large redshift and distance.

And now for the most important part: **Questions!**