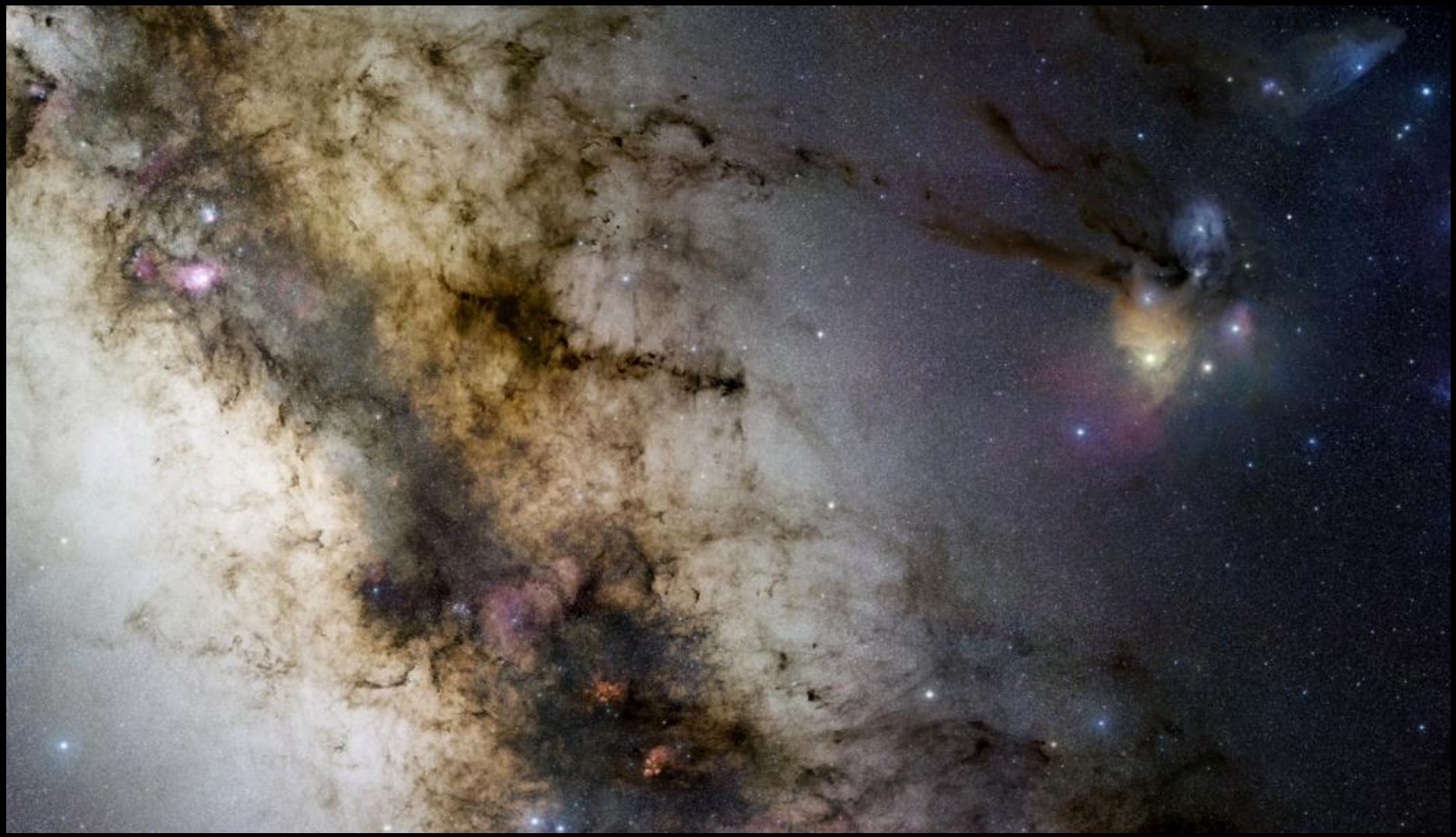
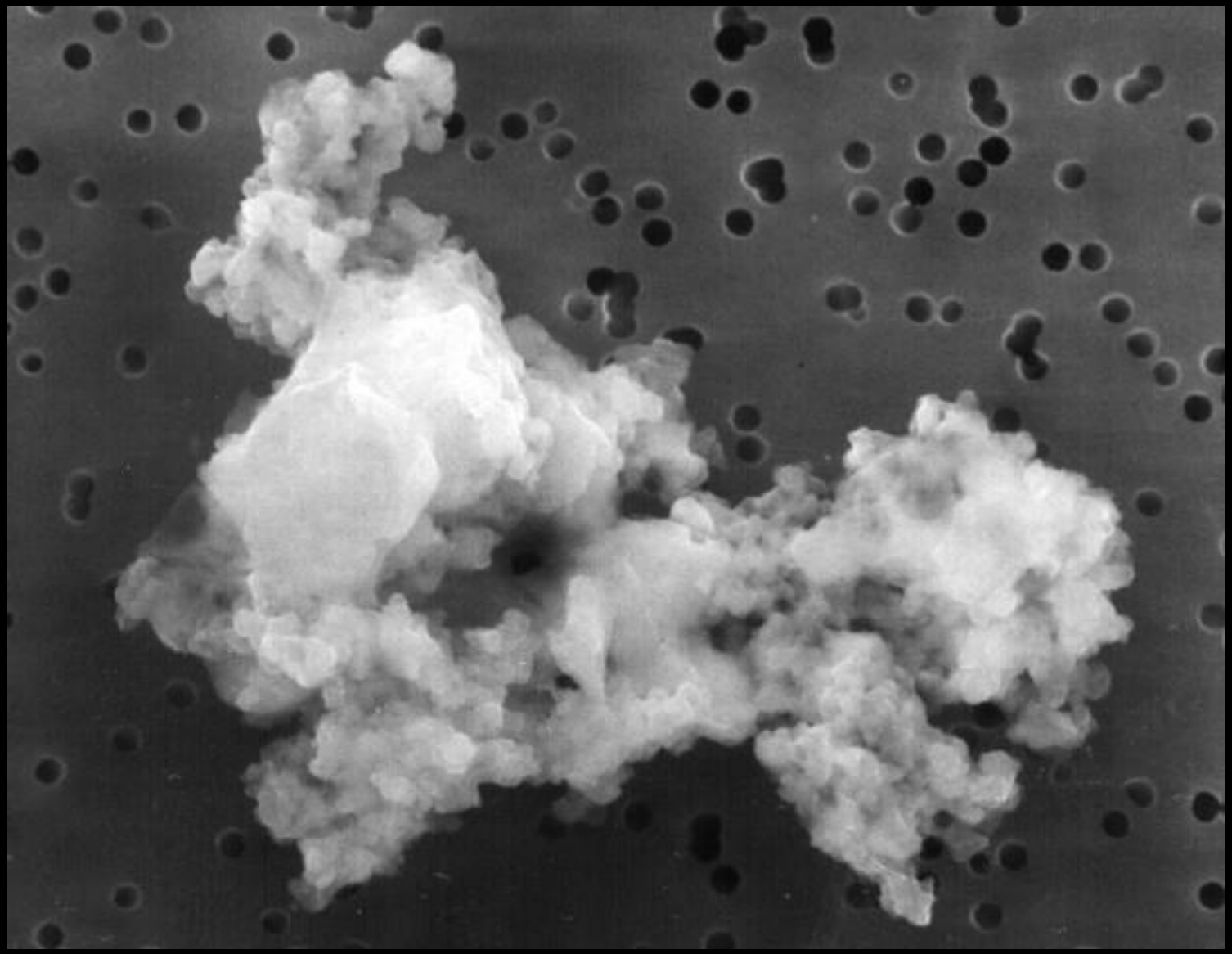
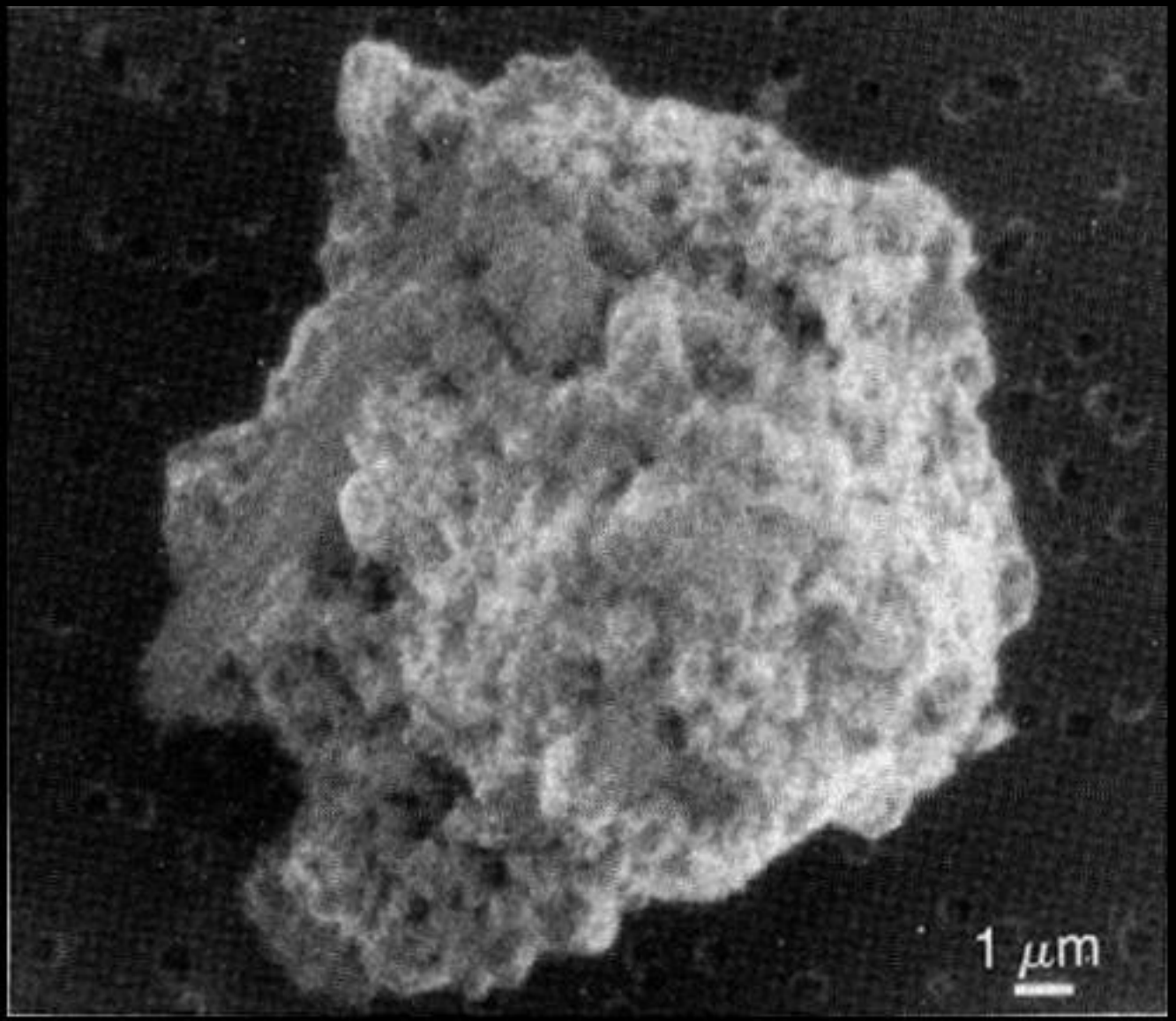
Stellar Birth

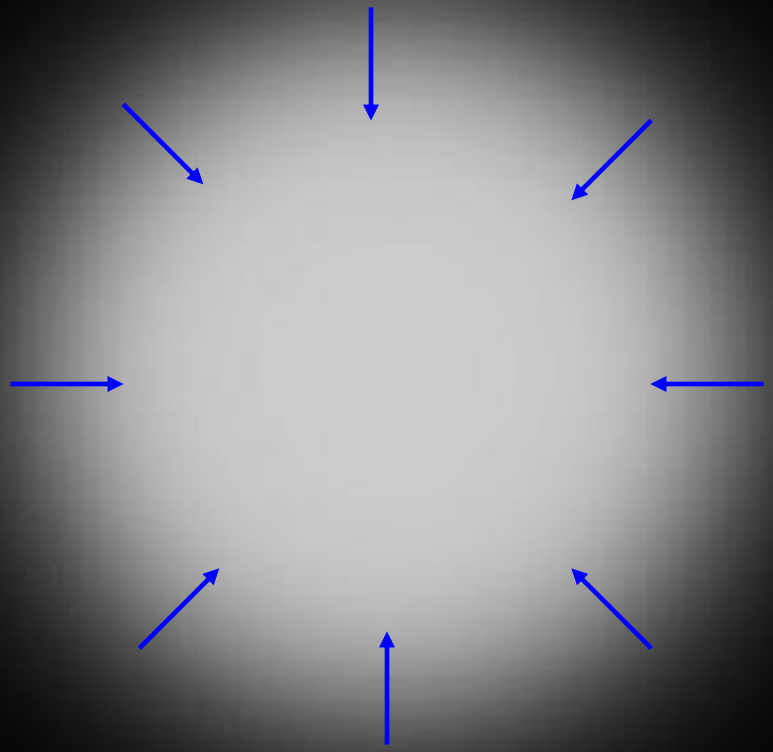
Video: https://youtu.be/lI57XIZ17hE



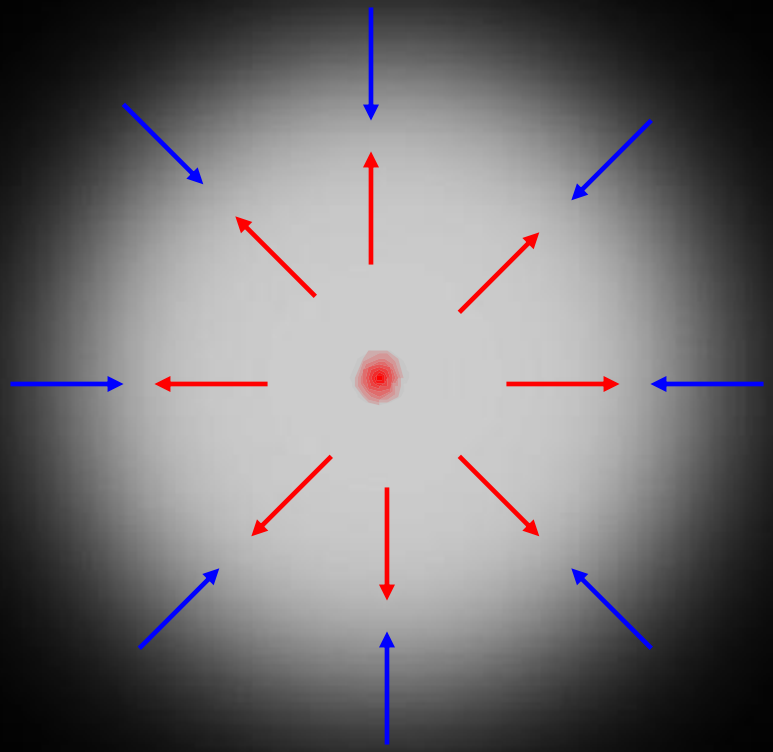



1 μm

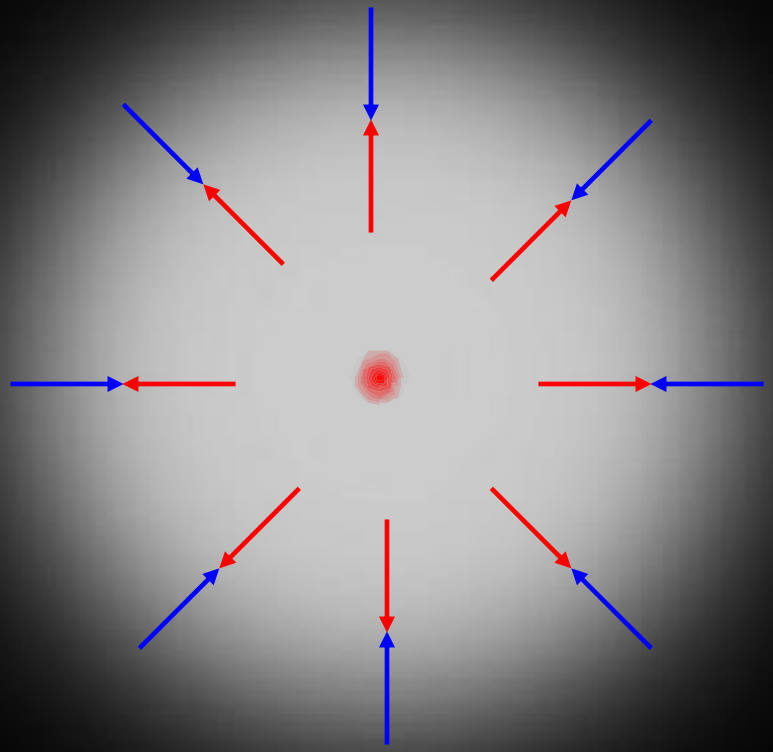
Clouds in space collapse because the force of gravity pulls inward..



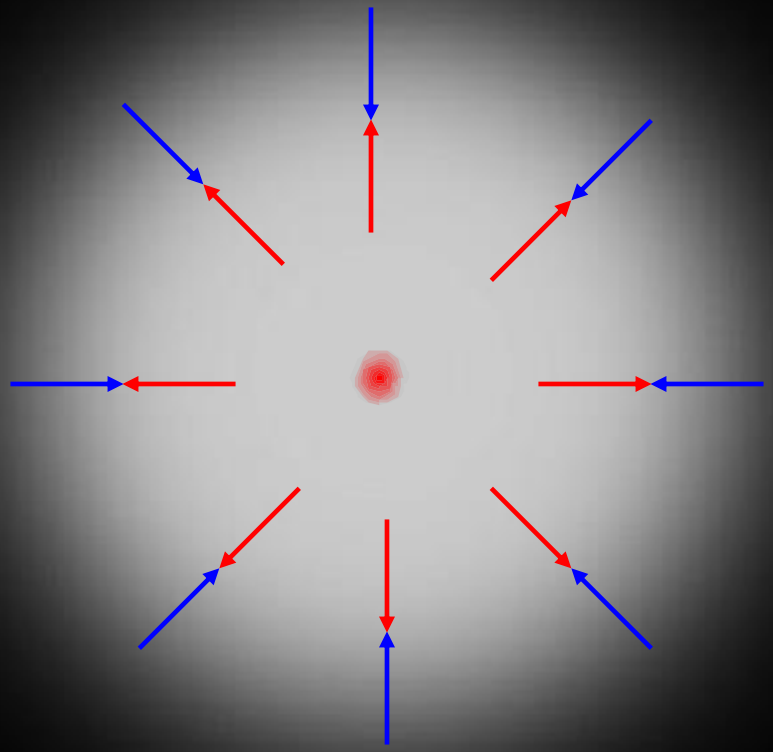
Collapse causes the interior to heat up, and then light coming from the center pushes back on gravity



The light pressure pushing out will eventually balance perfectly with gravity pulling in.



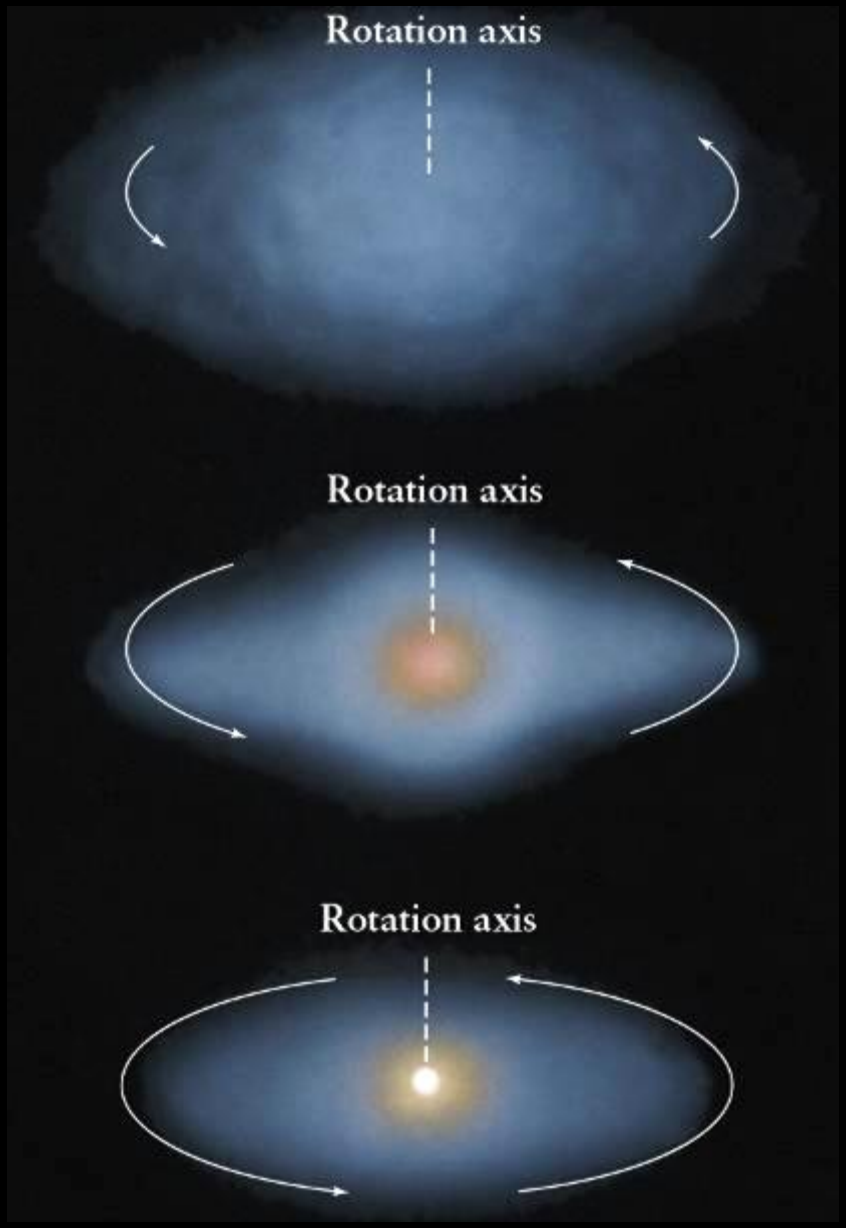
When the center is so hot that H's fuse into He, a star is born .



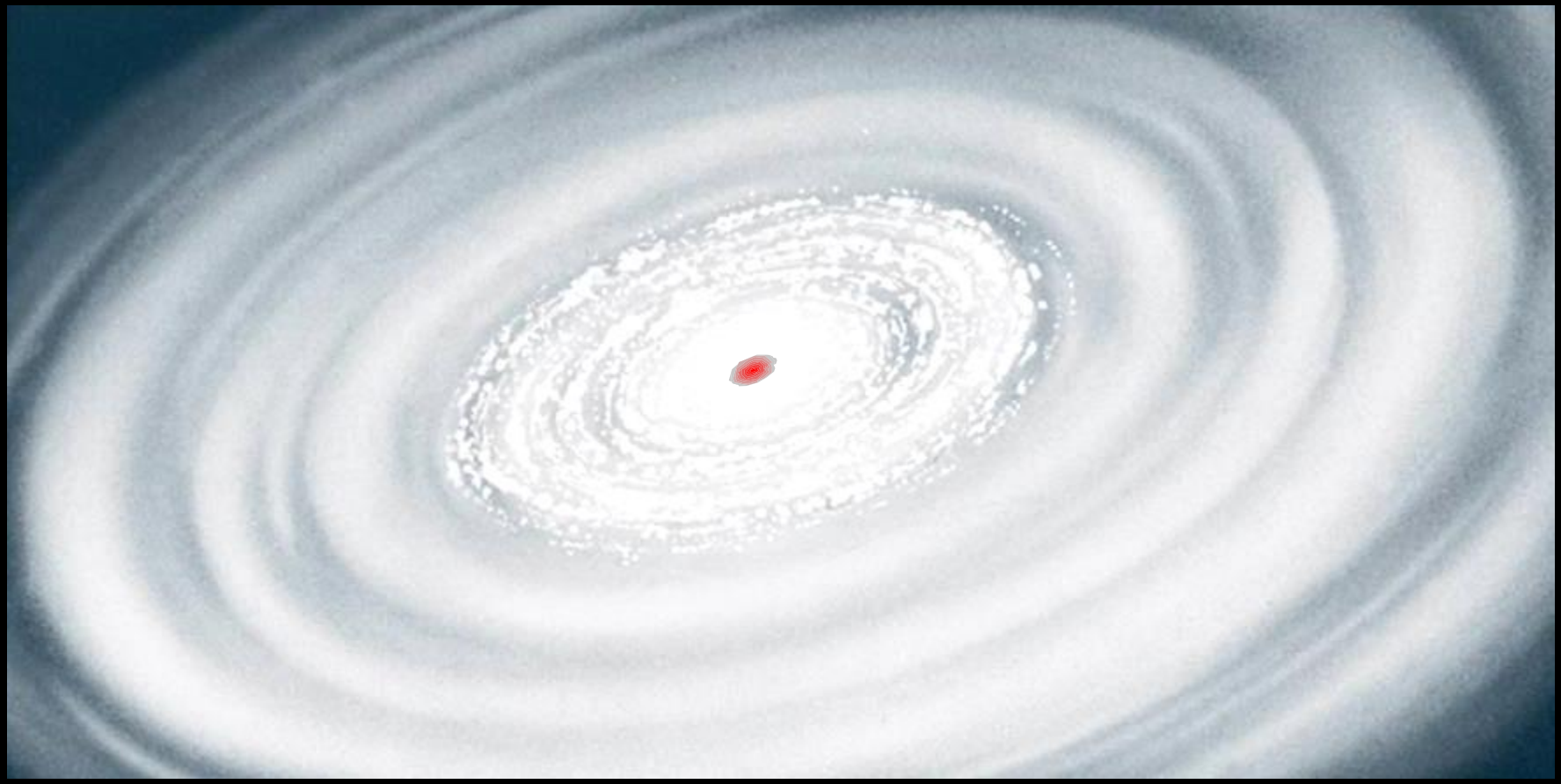
As a cloud collapses, it spins faster

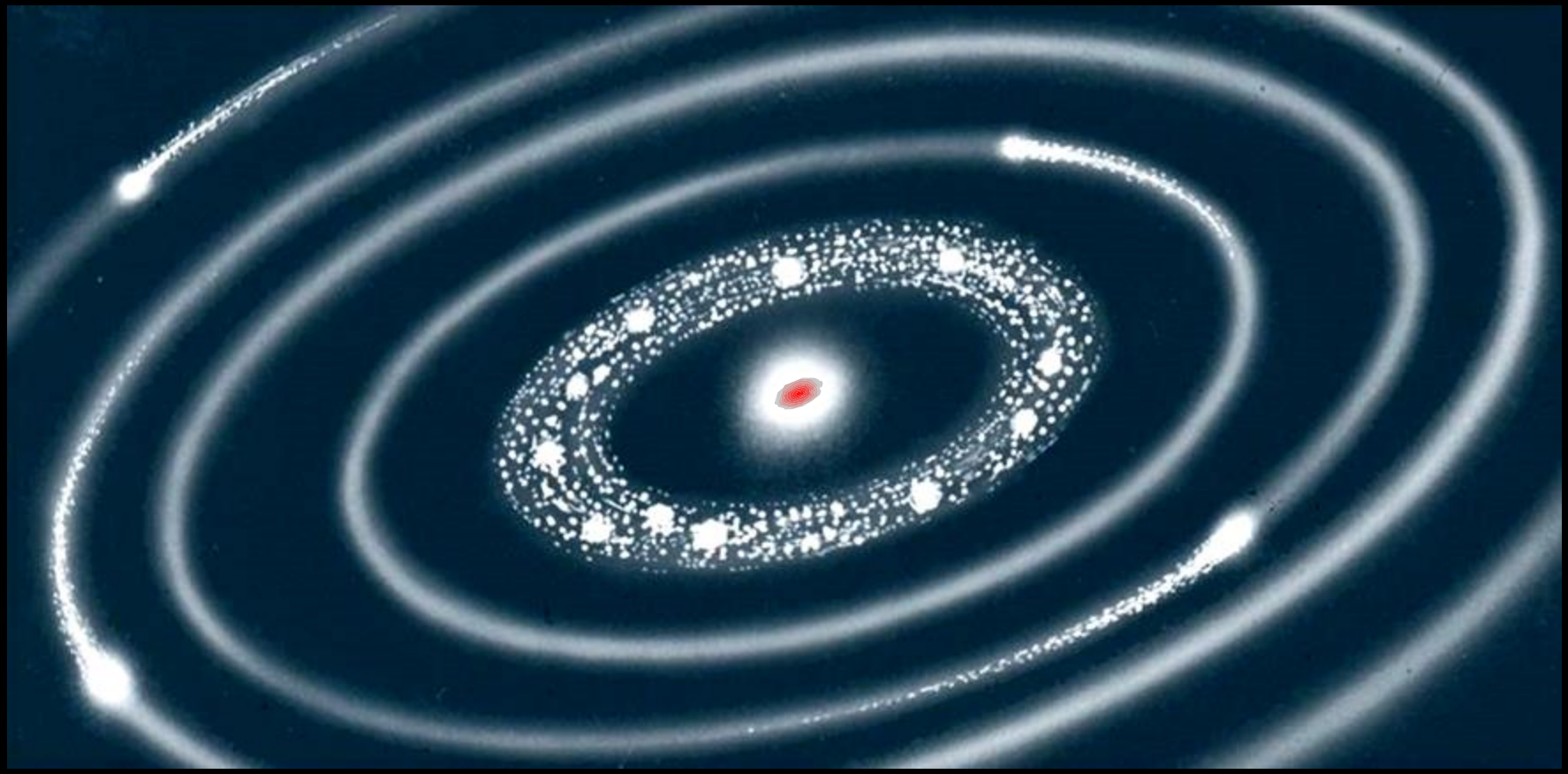
and faster which flattens the gas and dust

into a disk around the star.



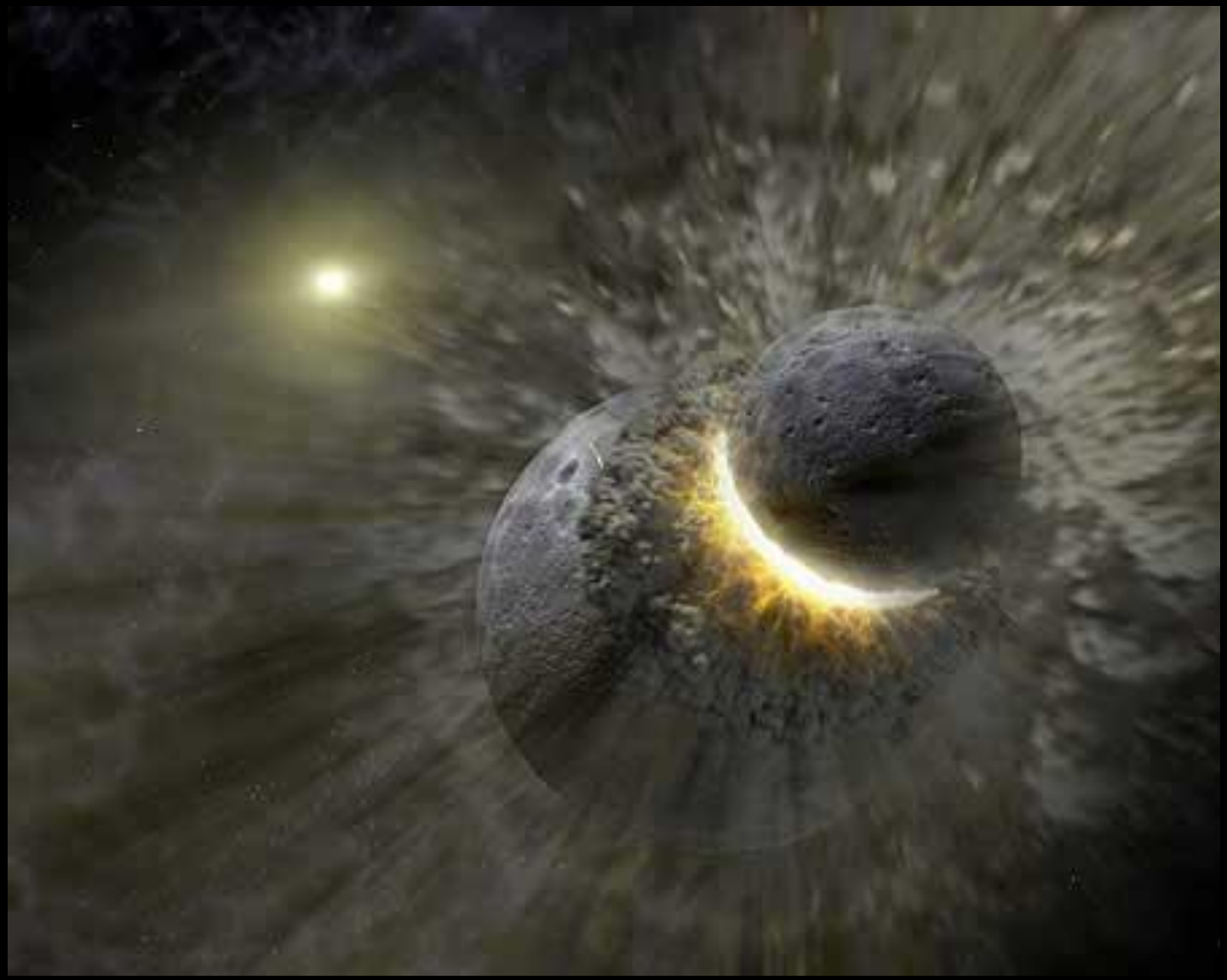
Particles of gas and dust stick together within the disk



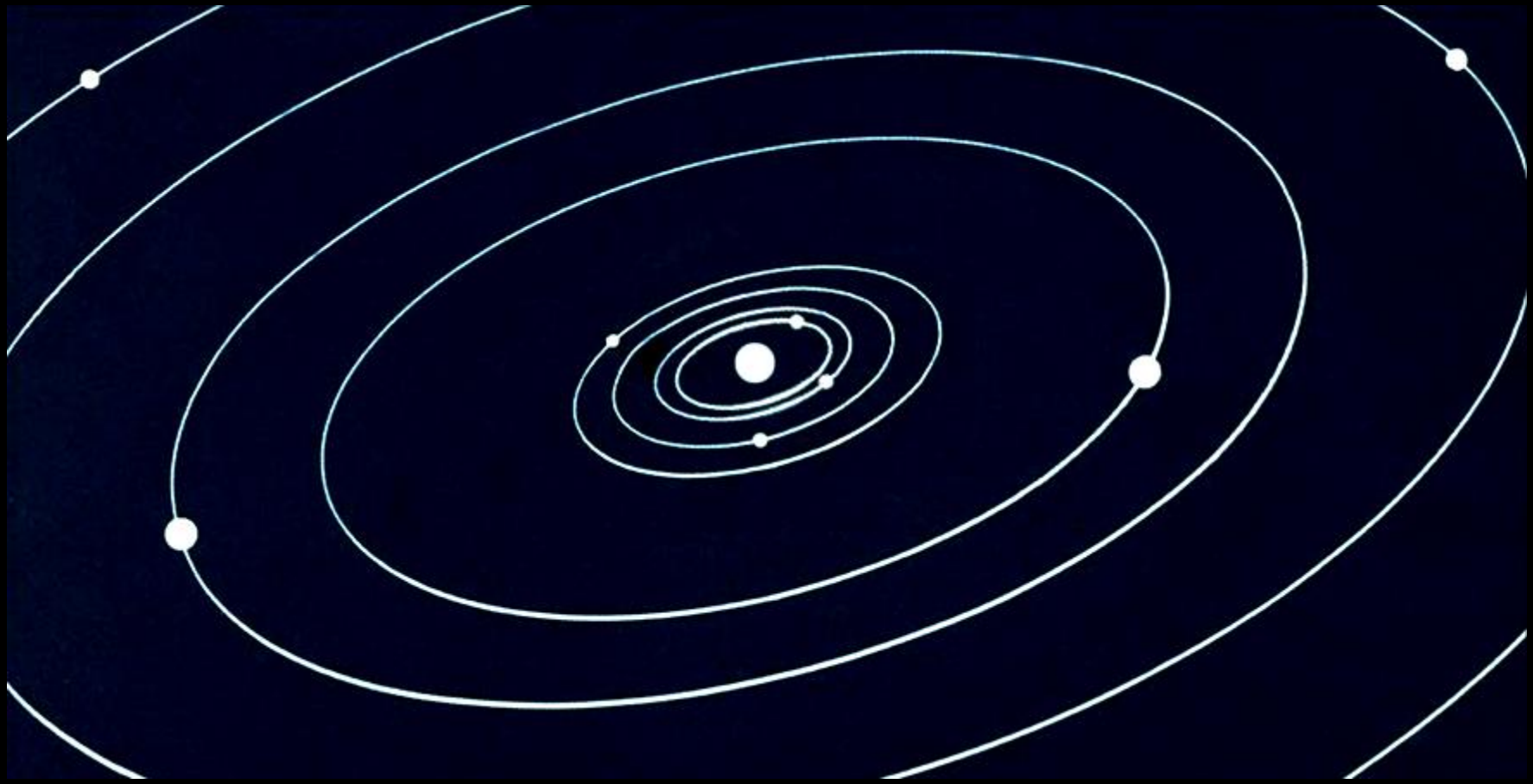


Dust and gas slam into each other and stick. We call this process accretion

The Earth formed by accretion at the same time as newborn Sun — about 4.6 billion yrs ago



About 150 planets formed, but most were not in stable orbits and duked it out over the first billion years or so.

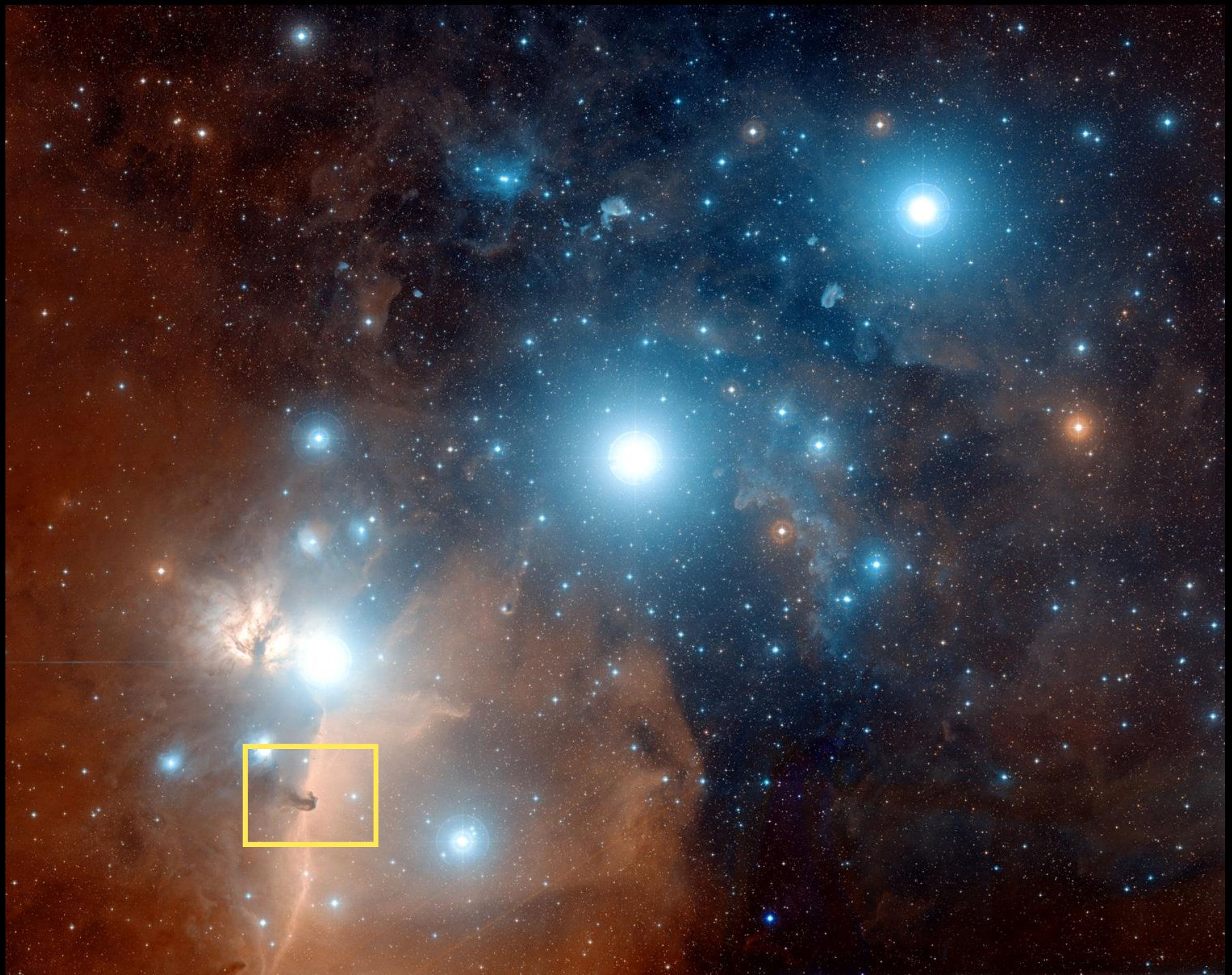


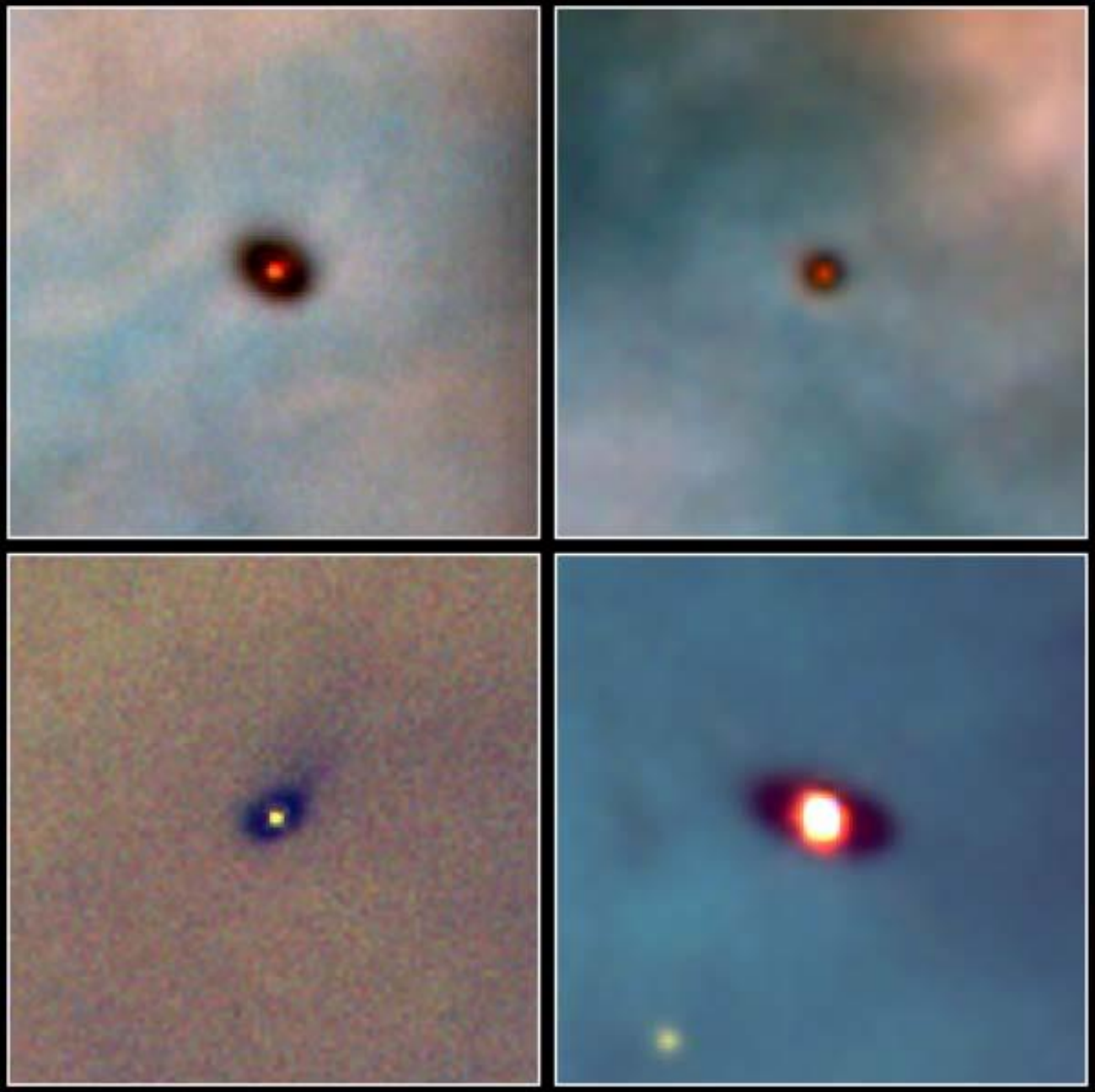
After about 1 billion years, most of the gas and dust was incorporated into the 9 surviving planets, plus a bunch of planetary debris (the asteroid belt)

Orion Constellation

Orion’s Belt

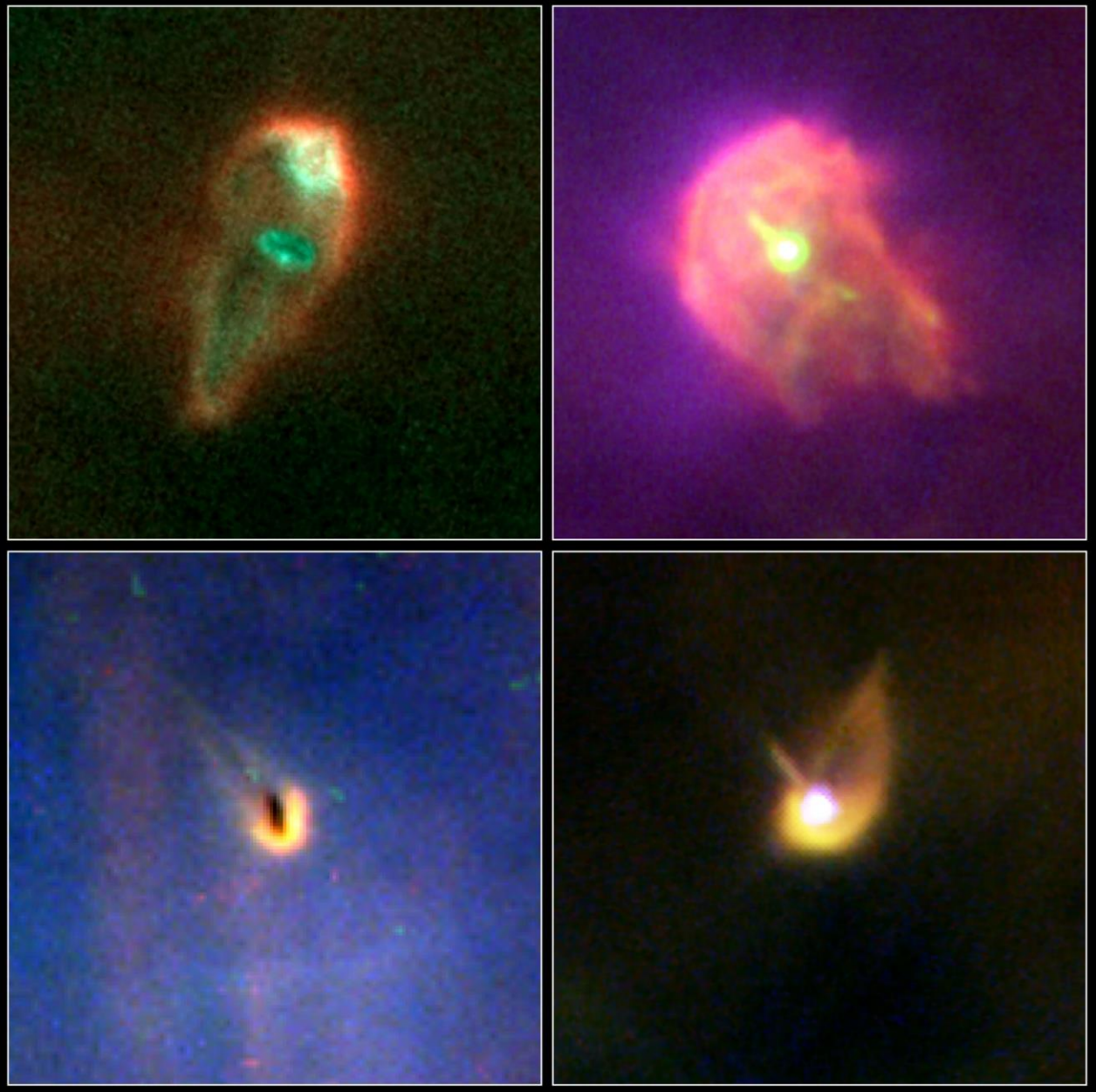
1,500 l-yr from earth — the belt of Orion



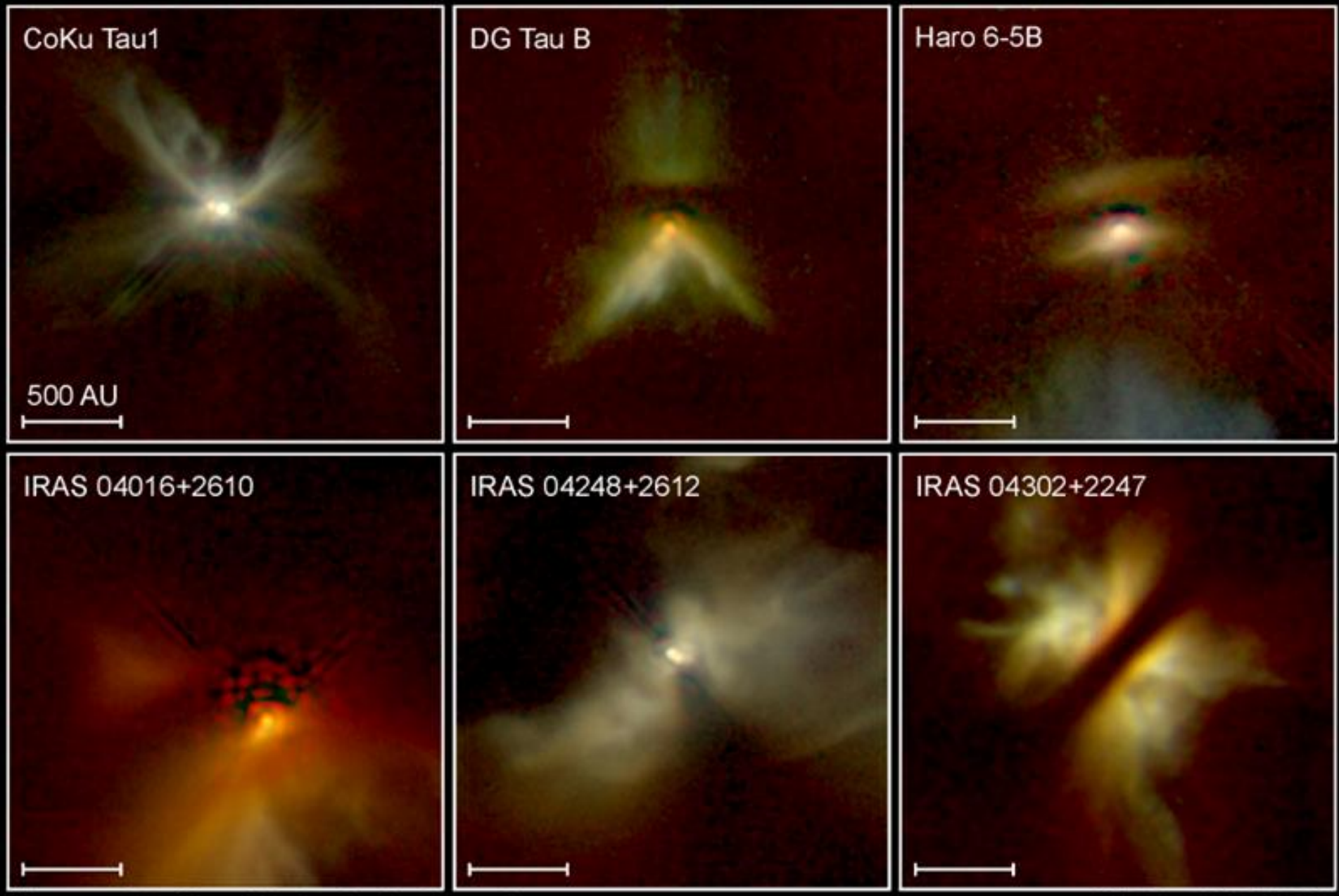


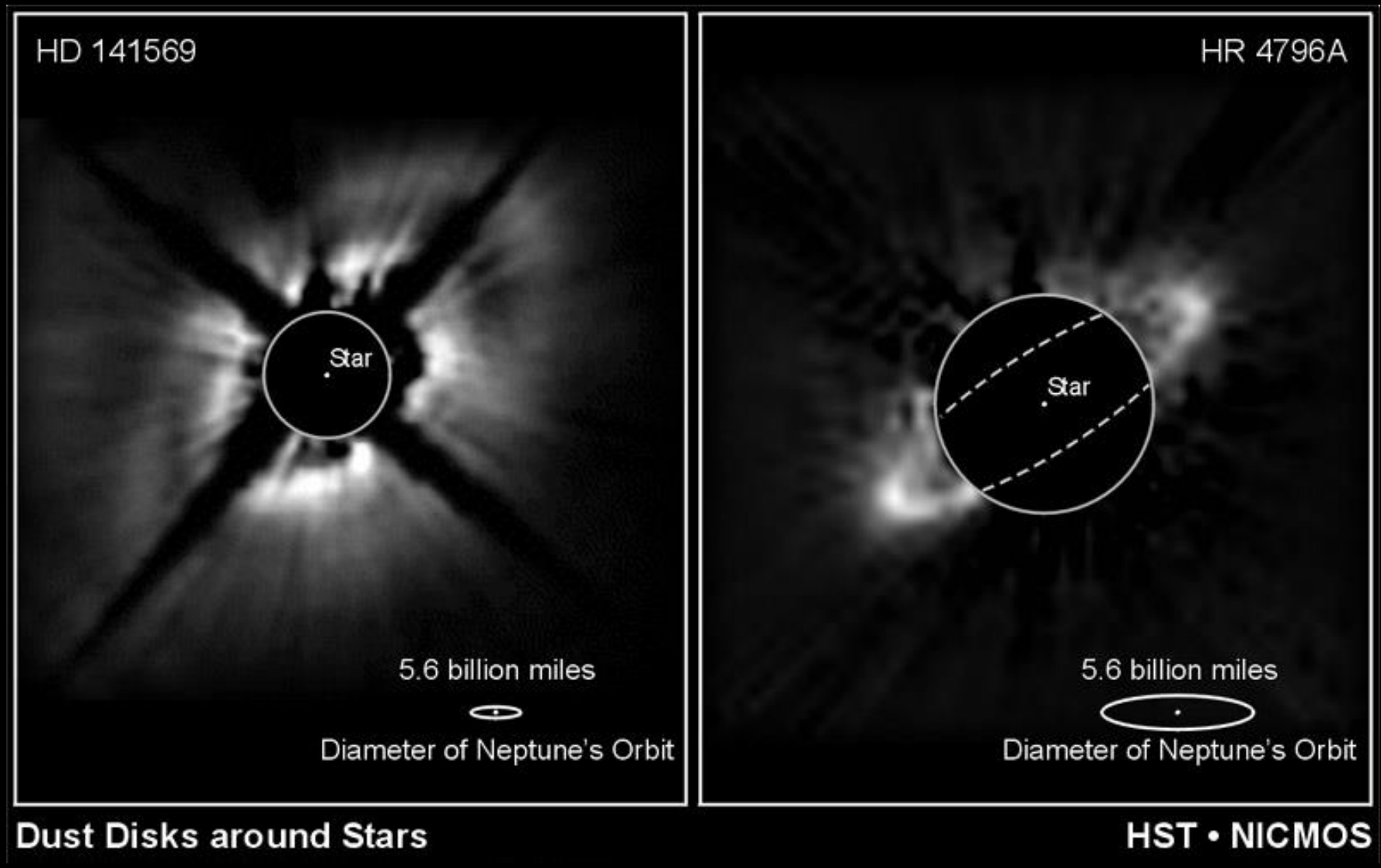
Protoplanetary Disks
Orion Nebula

HST • WFPC2



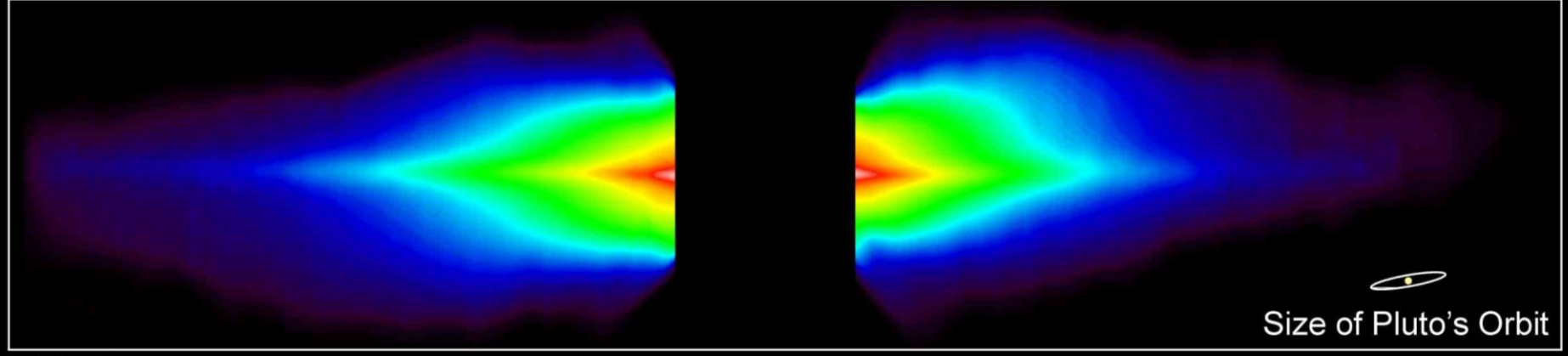
Protoplanetary Disks in the Orion Nebula
Hubble Space Telescope • WFPC2


CoKu Tau1
500 AU
DG Tau B
Haro 6-5B
IRAS 04016+2610
IRAS 04248+2612
IRAS 04302+2247
Young Stellar Disks in Infrared
HST • NICMOS

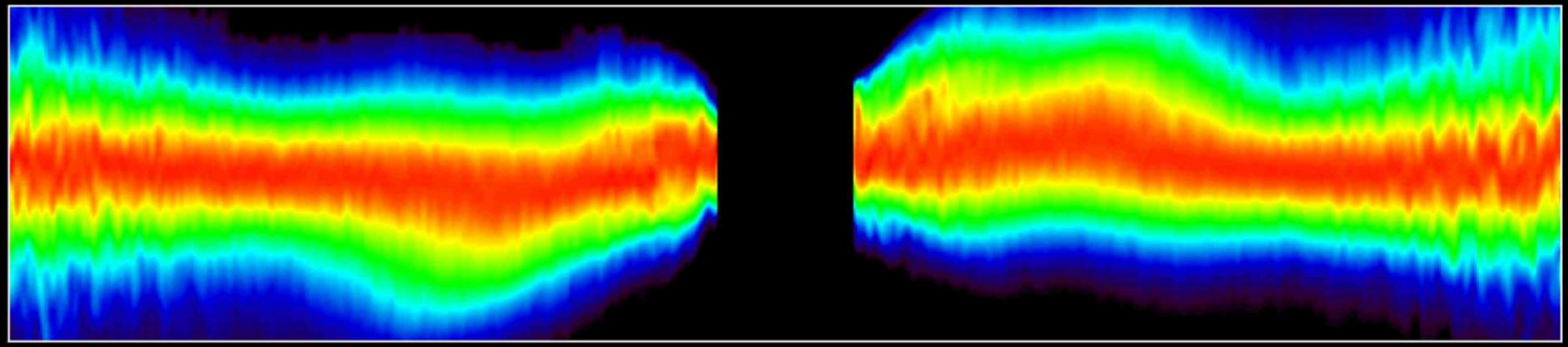


Dust Disks around Stars

HST • NICMOS



WFPC2



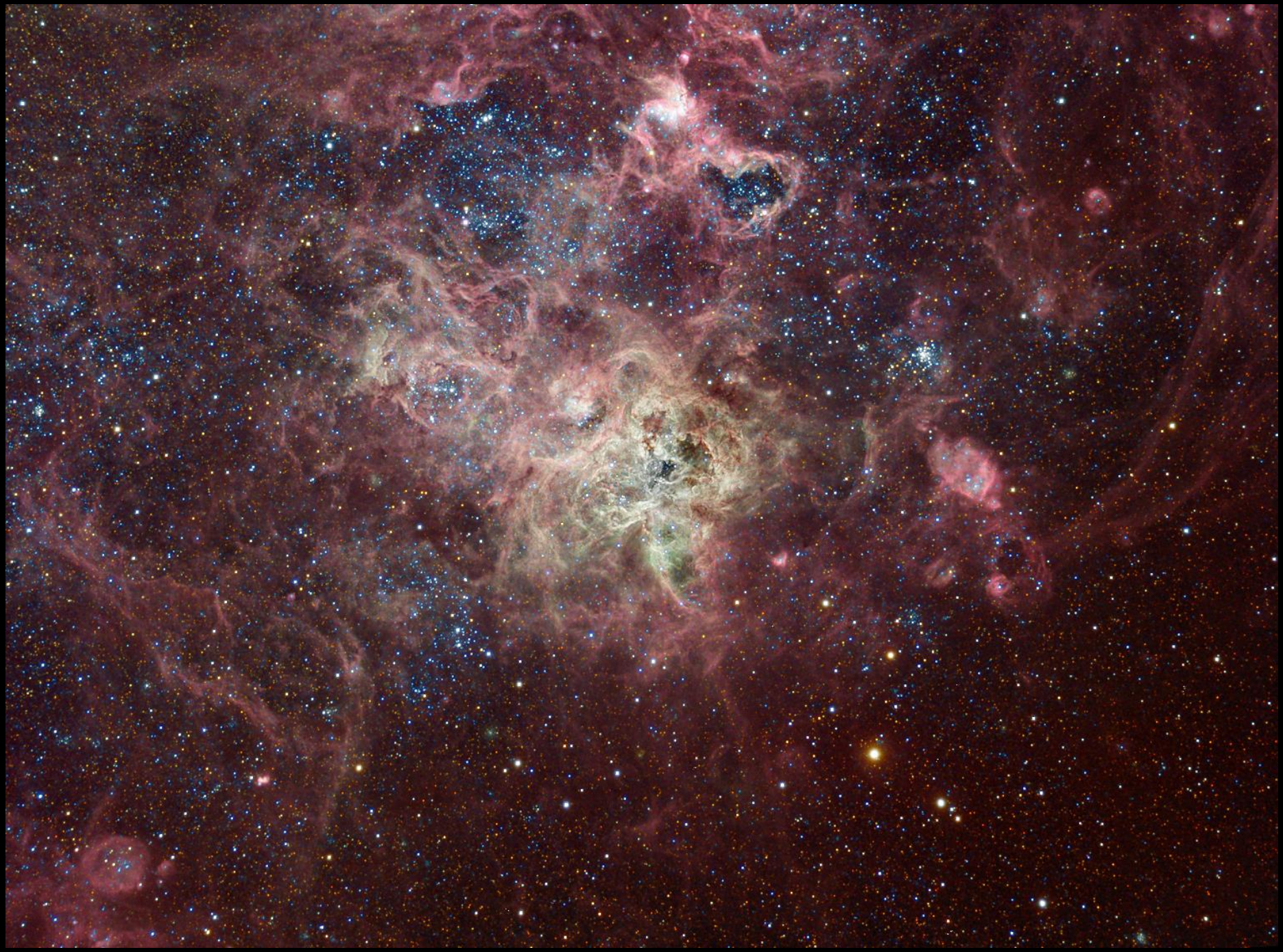
STIS

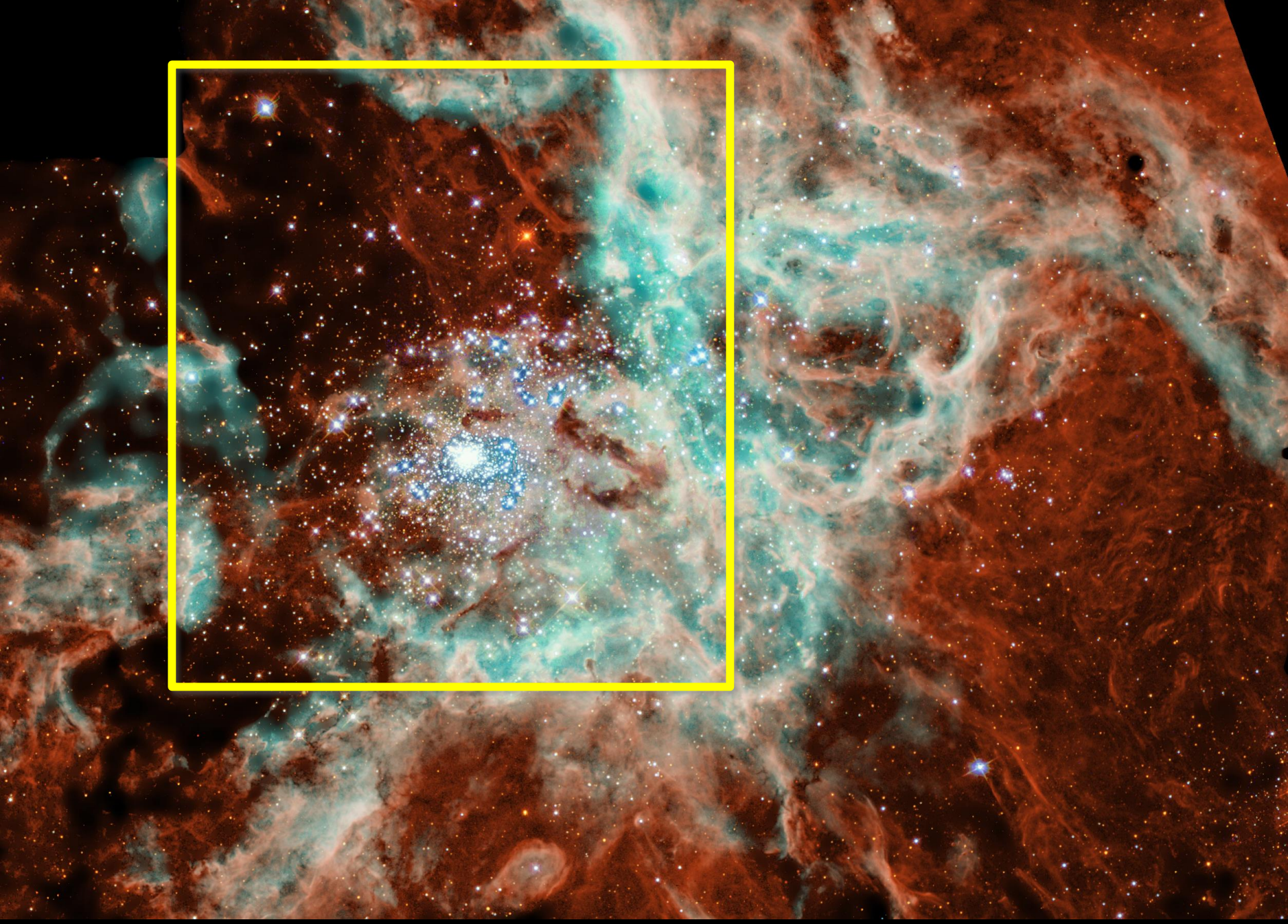
Beta Pictoris

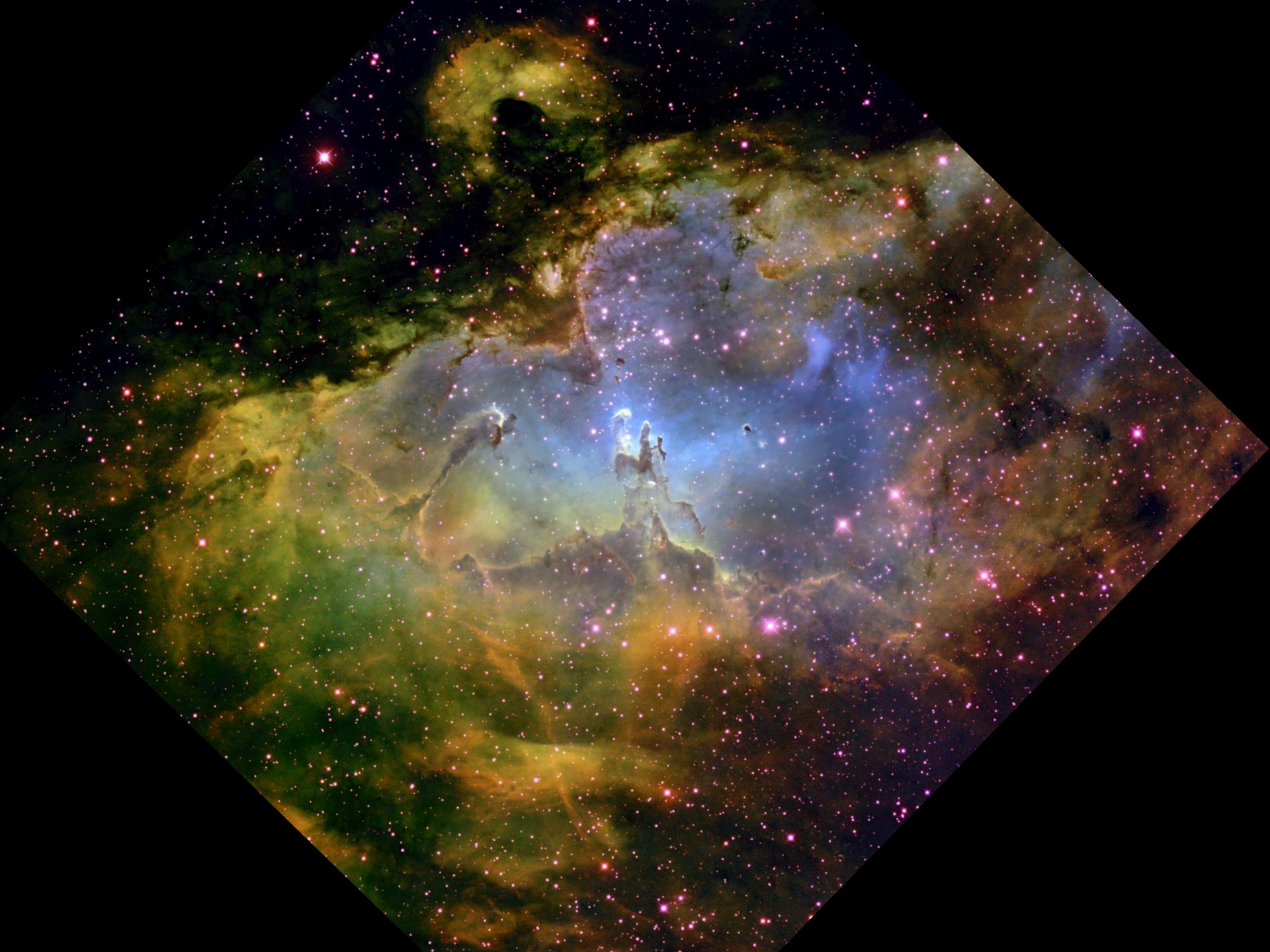
Hubble Space Telescope • WFPC2 • STIS

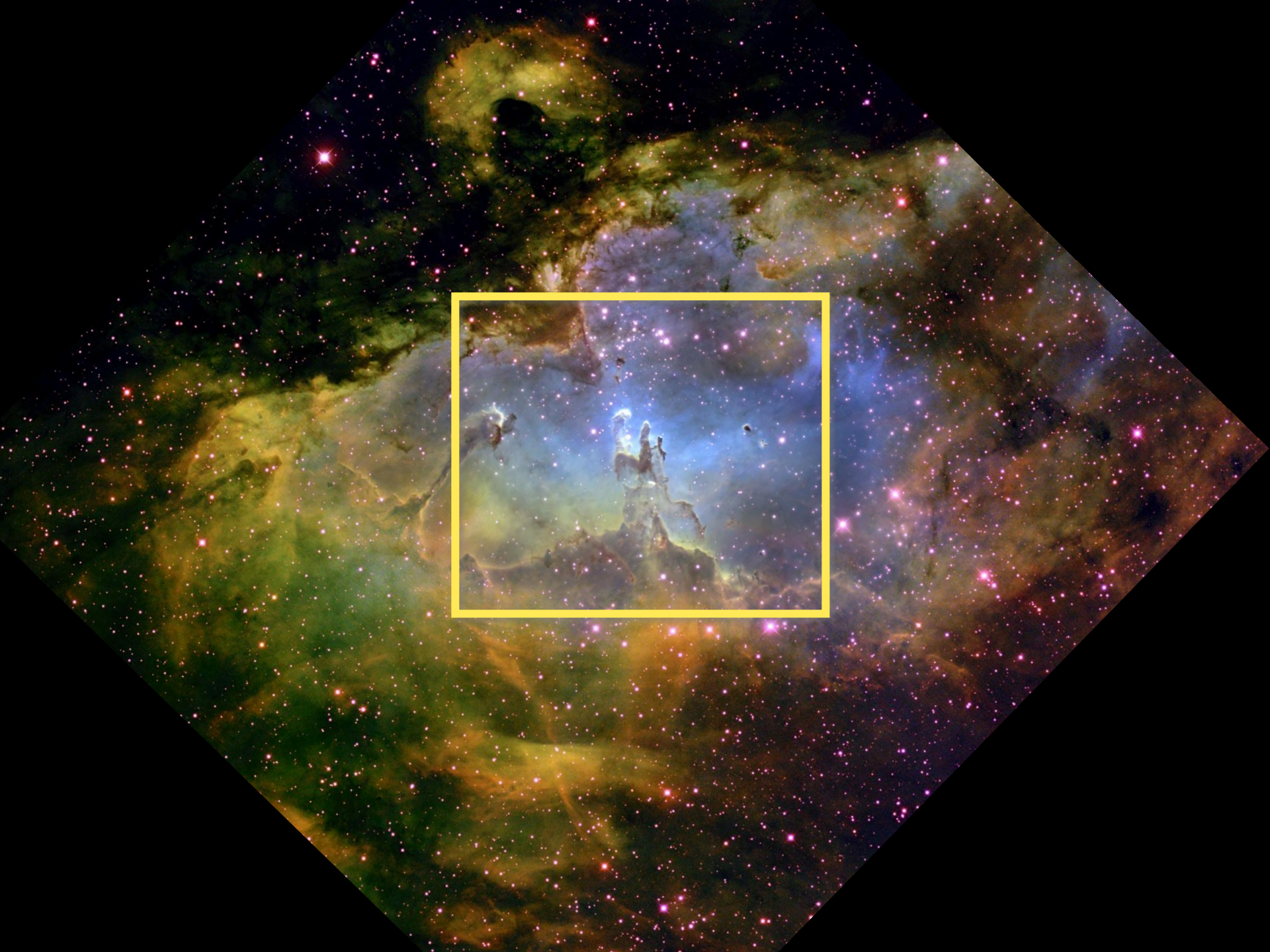
star formation region in constellation Cepheus

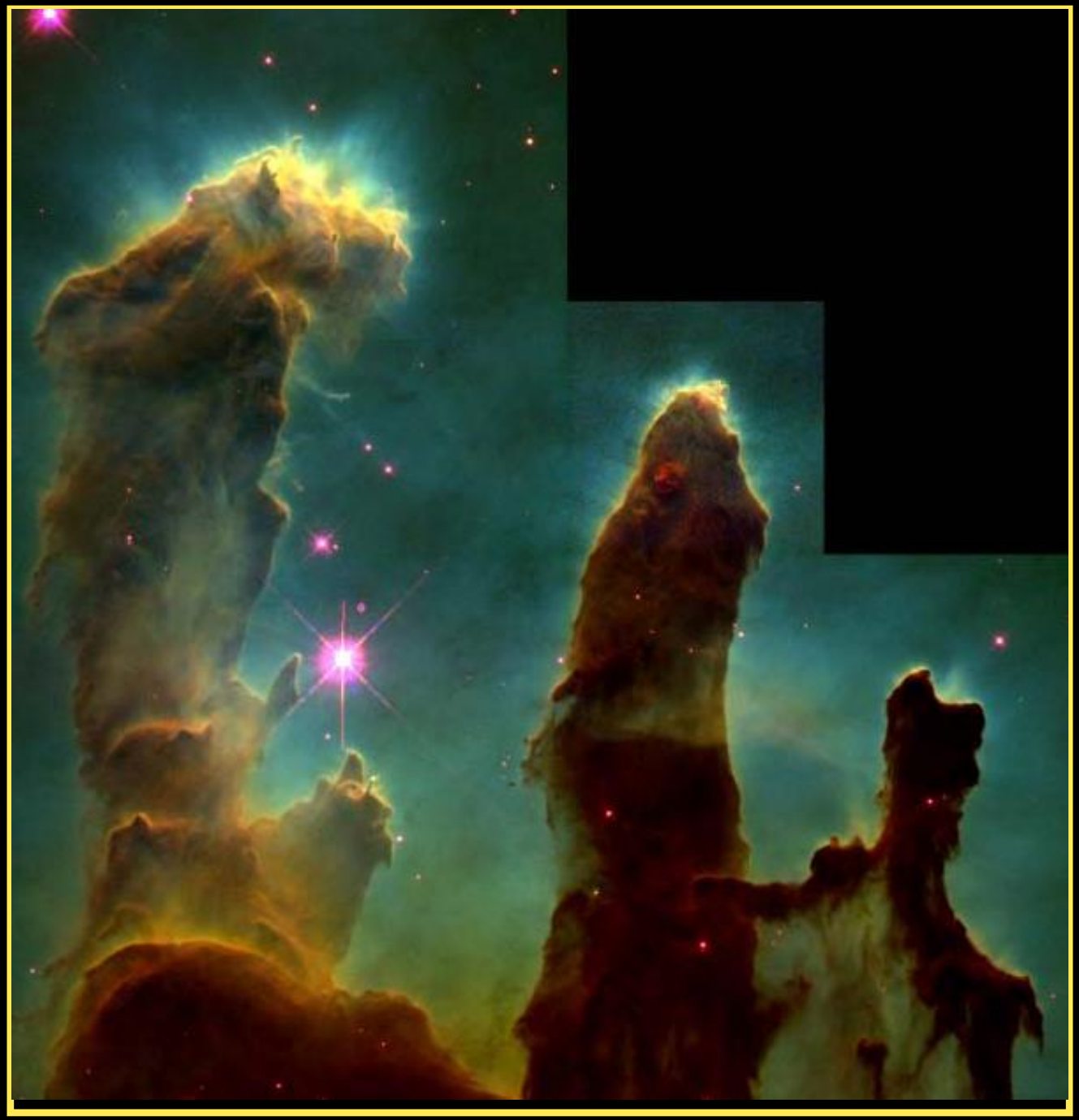
3,000 l-yr from earth and hundreds of l-yrs across



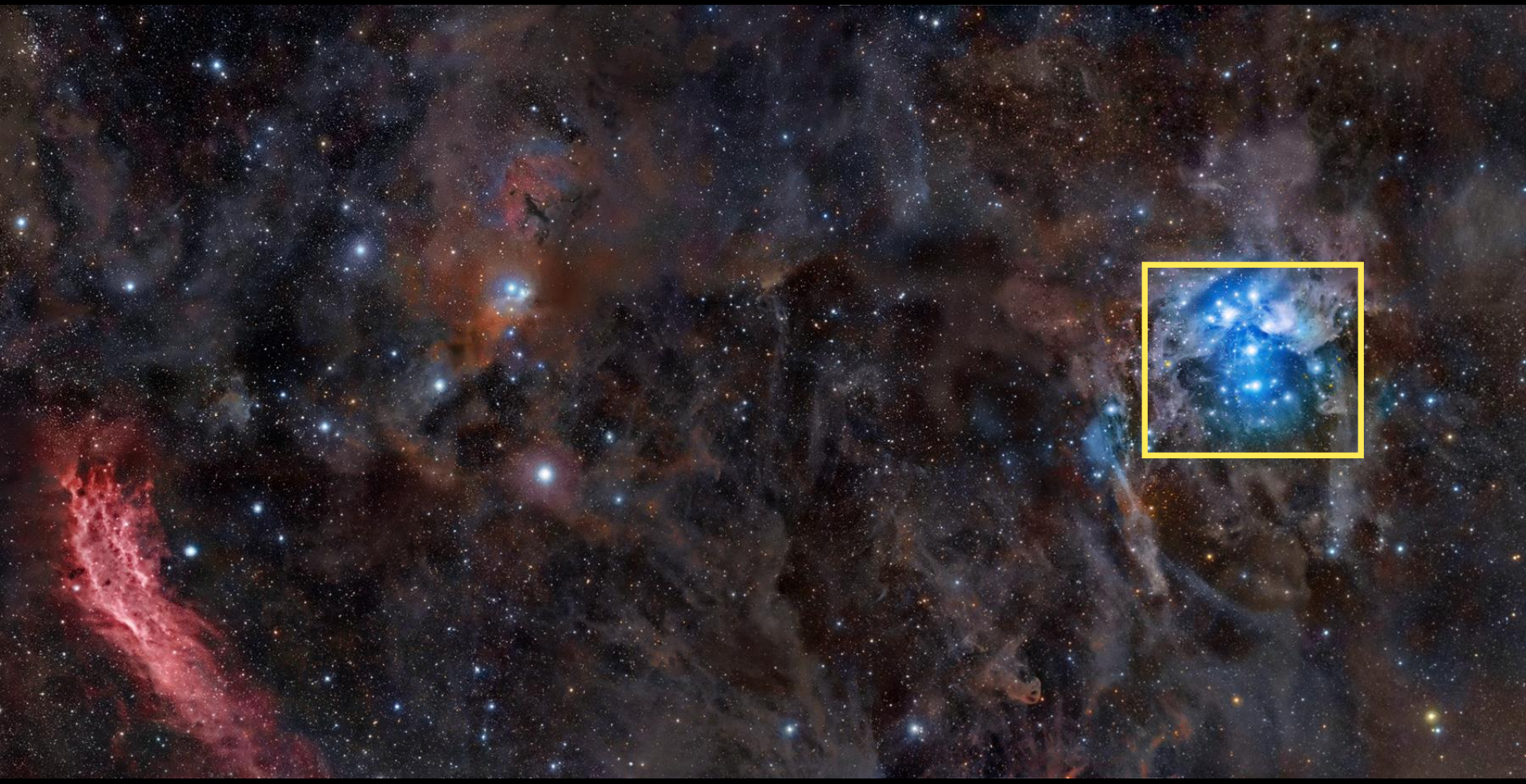


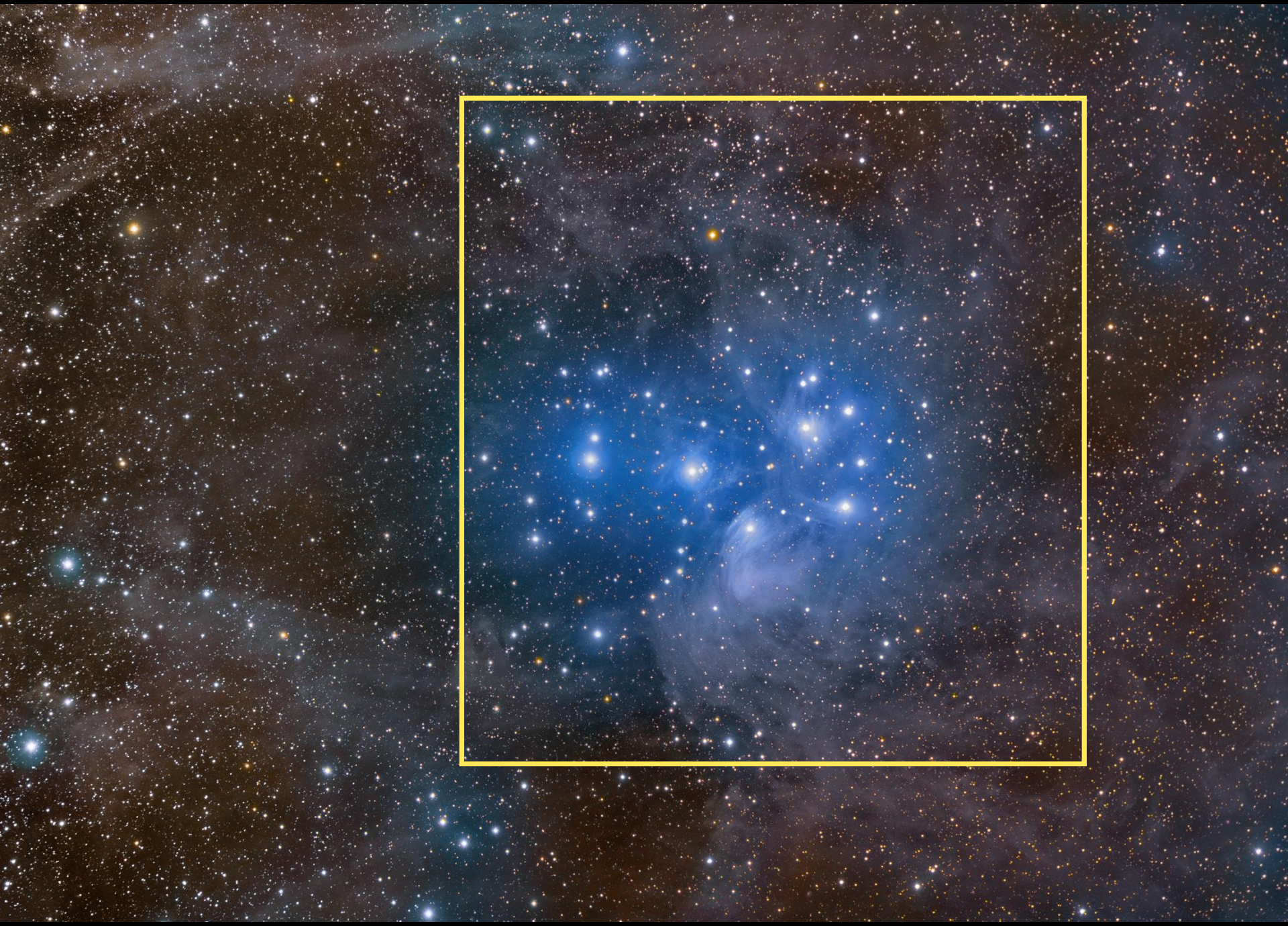






star formation region 20,000 l-yr from Earth





Review for Test 2

- Four fundamental forces
- Orbital Speed
- Mass versus Weight ($Wt_m = 1/6\ Wt_E$)
- Escape speed ($v_m = 1/5\ v_E$)
- Tides
- Energy, Luminosity
- Temperature, Heat
- Solar Nebula theory
- Stellar Birth