When massive stars form, they can heat the hydrogen gas enough for it to be ionized

These regions of hot gas are called **HII regions**

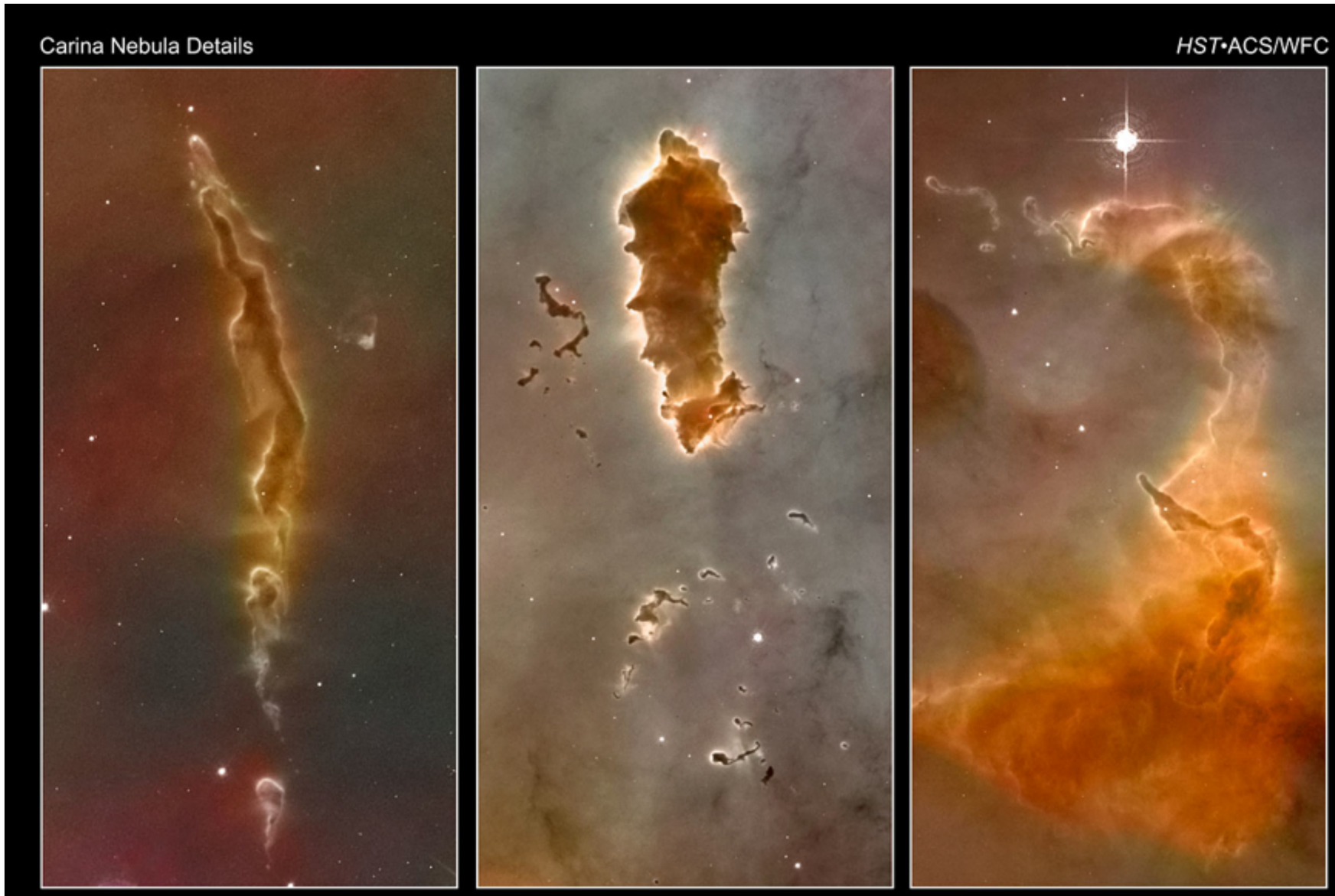
HII (“H two”) is astronomer-speak for ionized hydrogen

Hot clouds of ionized gas are bright and can be seen in visible light

The Rosette Nebula: Newly formed O and B stars heat the center of cloud, pressure of their starlight blows gas away from the center

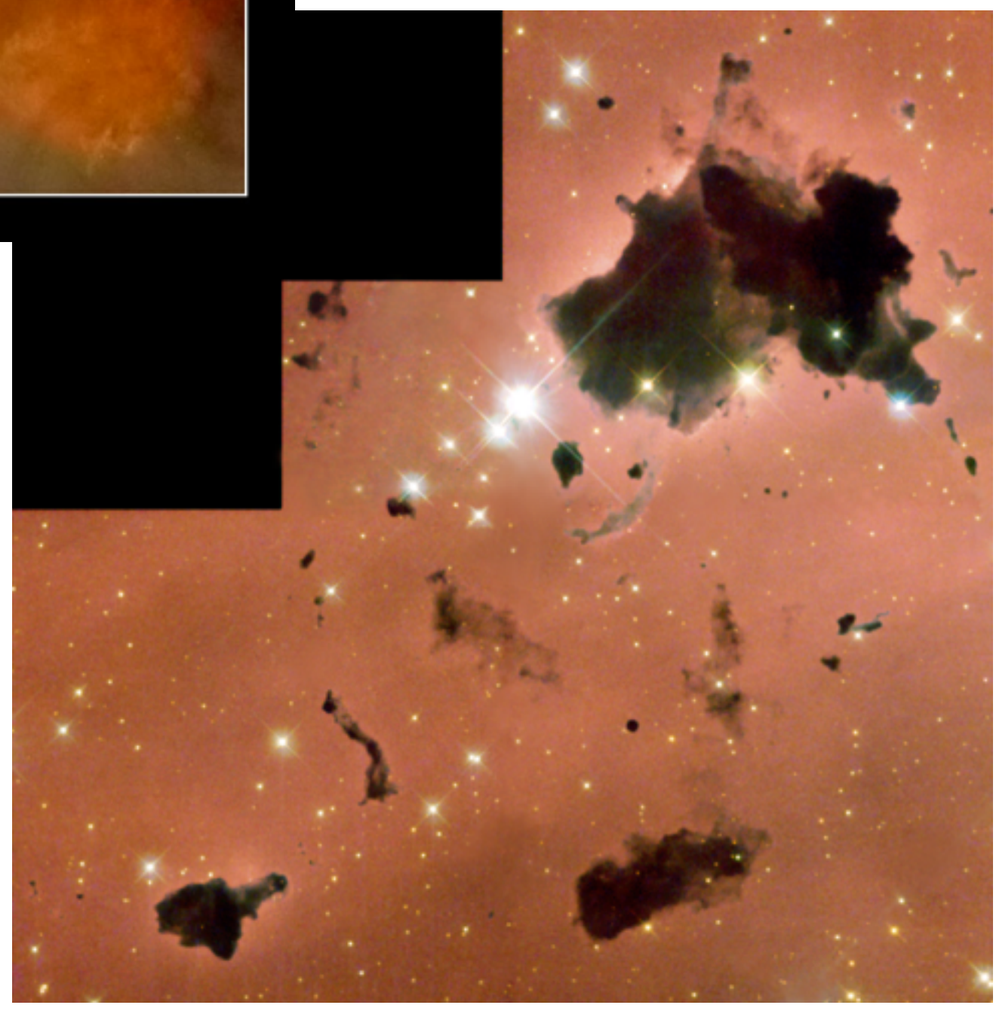
Star Formation

Orion Nebula



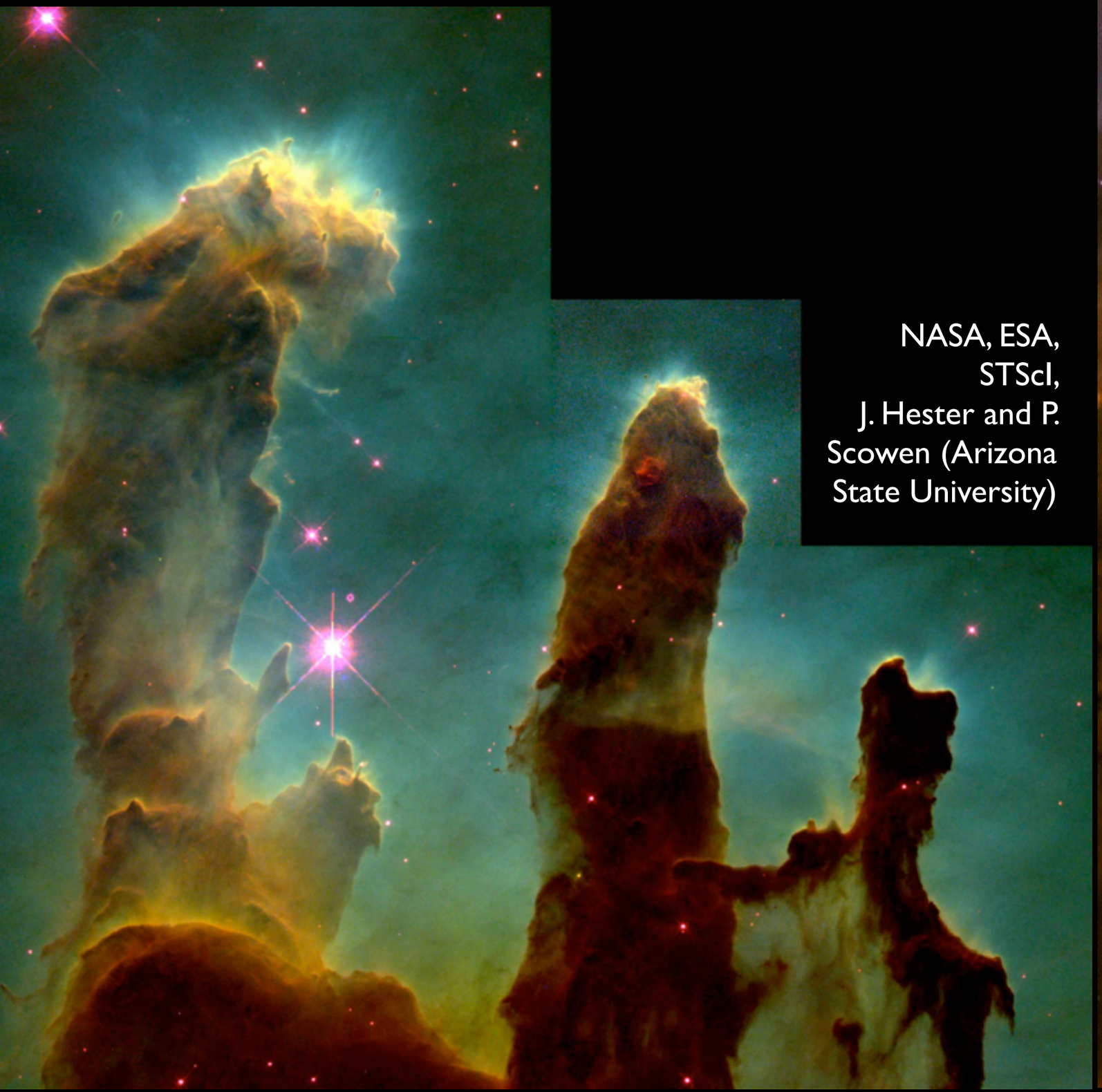
NASA, ESA, N. Smith (University of California, Berkeley), and The Hubble Heritage Team (STScI/AURA)

NASA

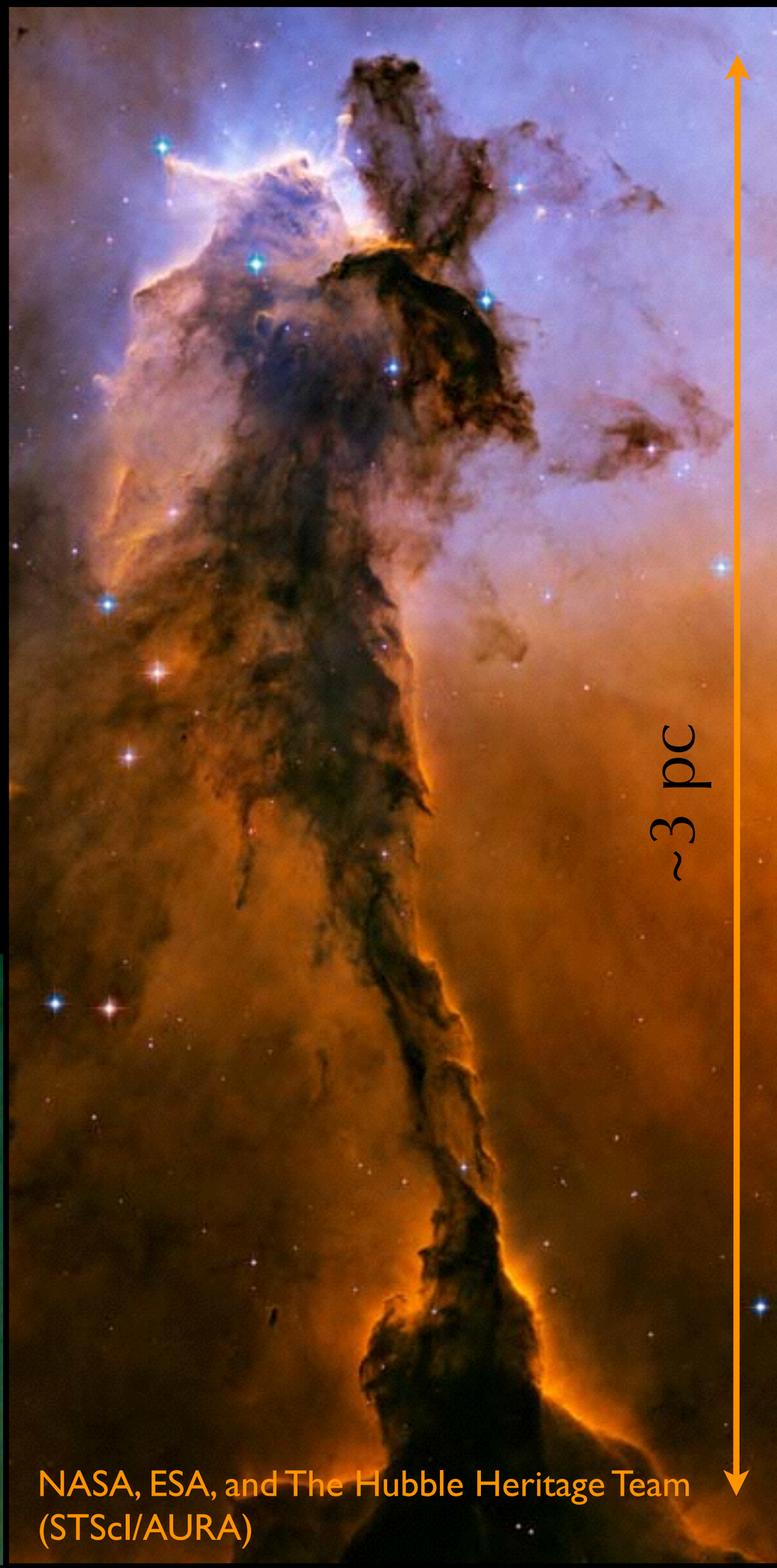


Bok globules

- Eagle Nebula in Orion
- Massive stars evaporate clouds in which low mass stars are forming



NASA, ESA, STScI, J. Hester and P. Scowen (Arizona State University)



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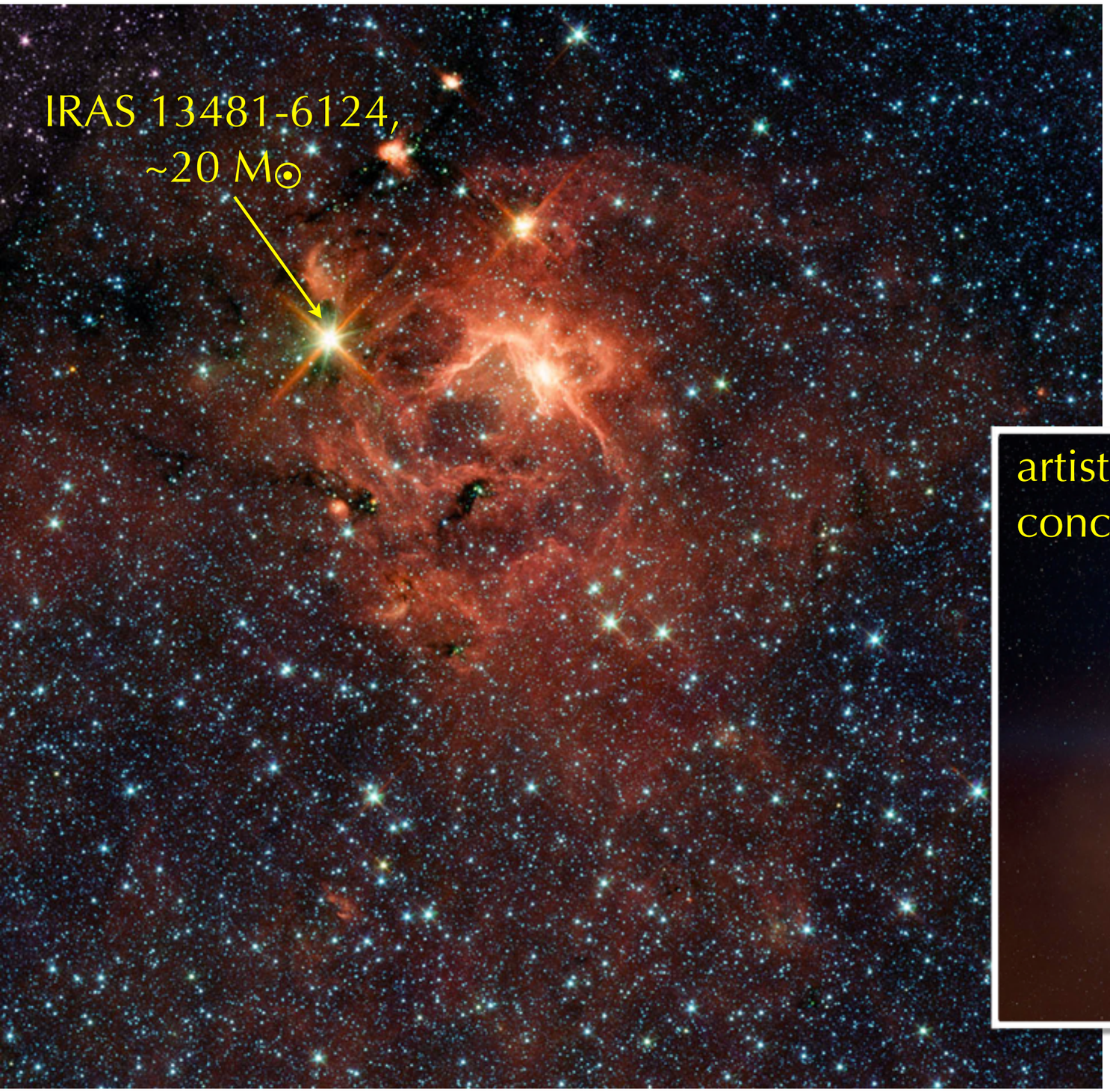
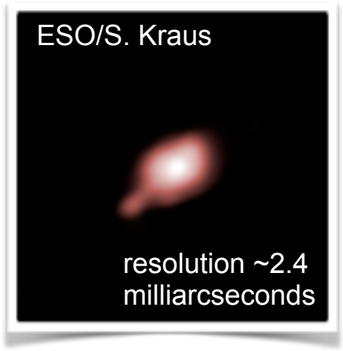
Jean-Charles Cuillandre (CFHT), Hawaiian Starlight, CFHT

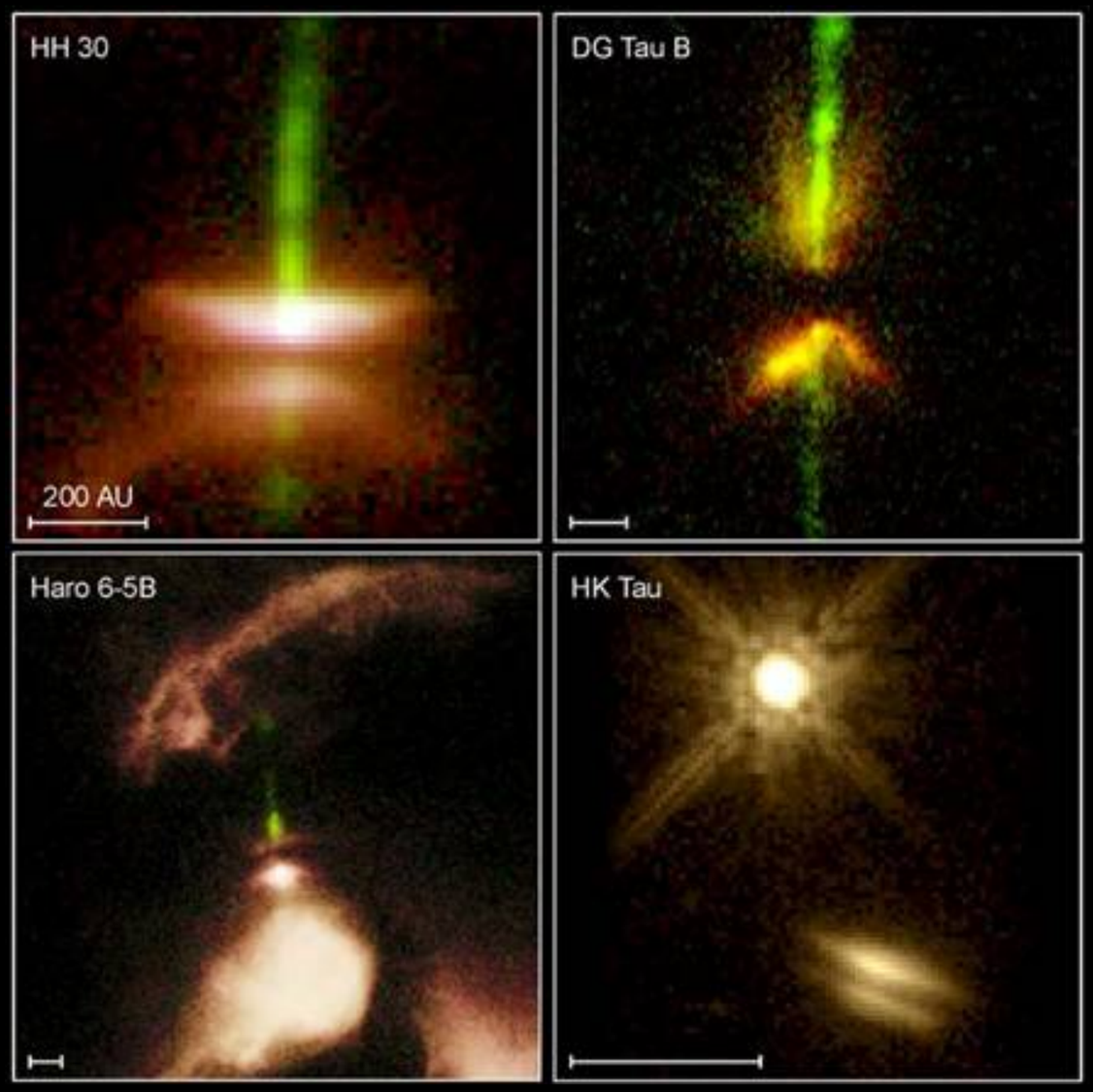
- Horsehead Nebula in Orion
- Dark molecular cloud silhouetted against bright nebula
- Young, massive B star (strong UV source)





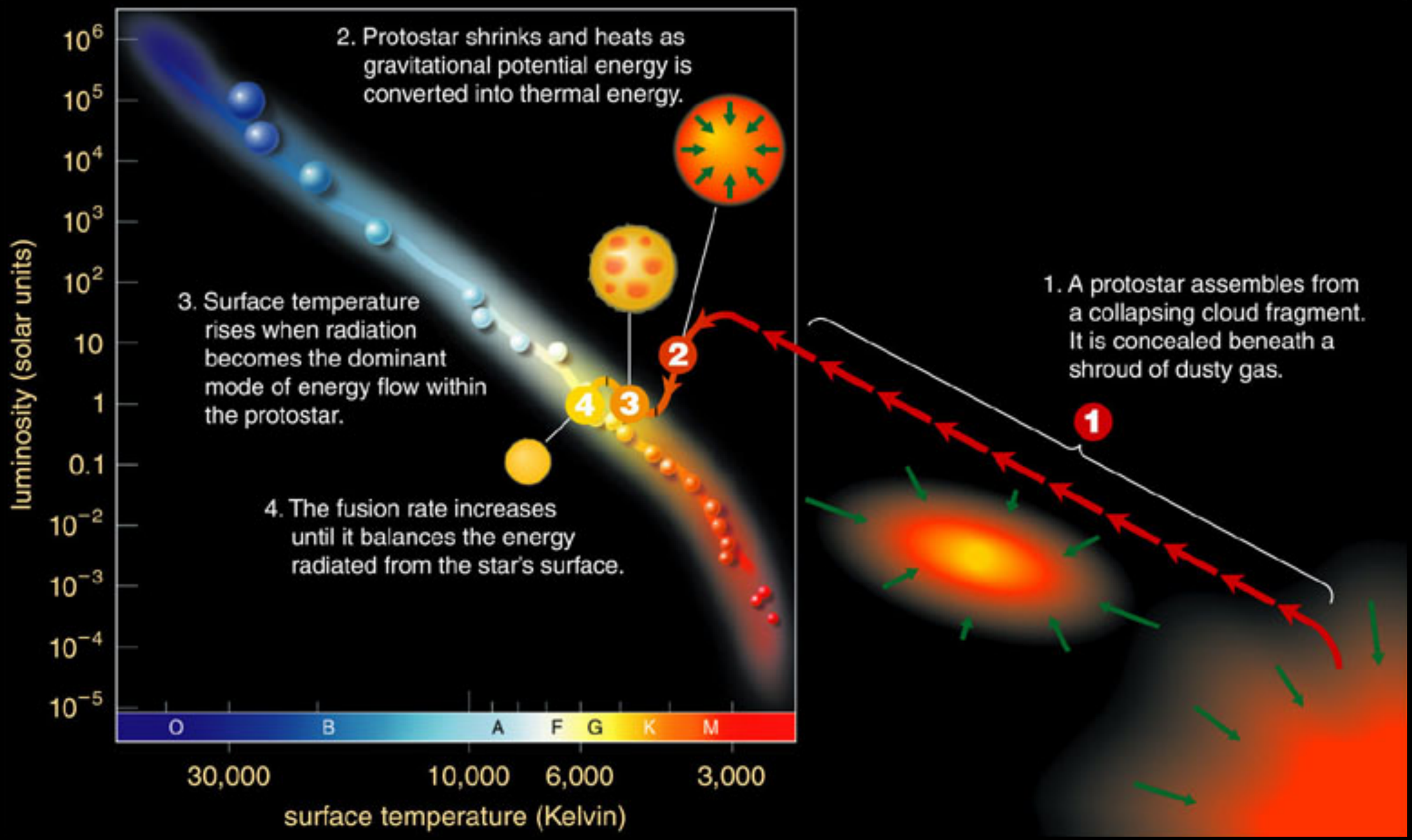
ESO/NASA/JPL-Caltech/S. Kraus

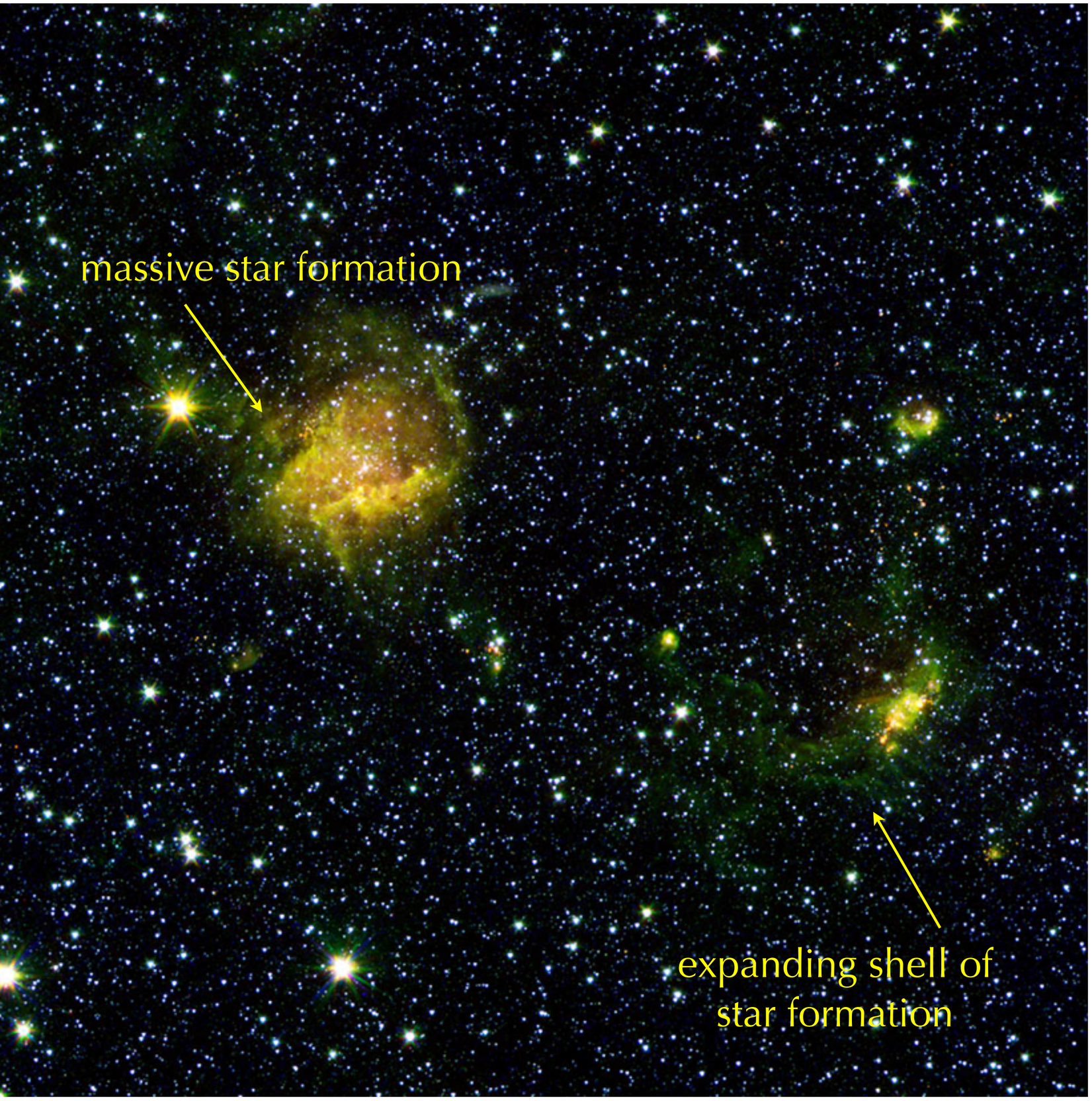
Disk around a massive young star observed with European Southern Observatory Very Large Telescope Interferometer



Collapsing protostars may have jets: **Herbig-Haro objects**

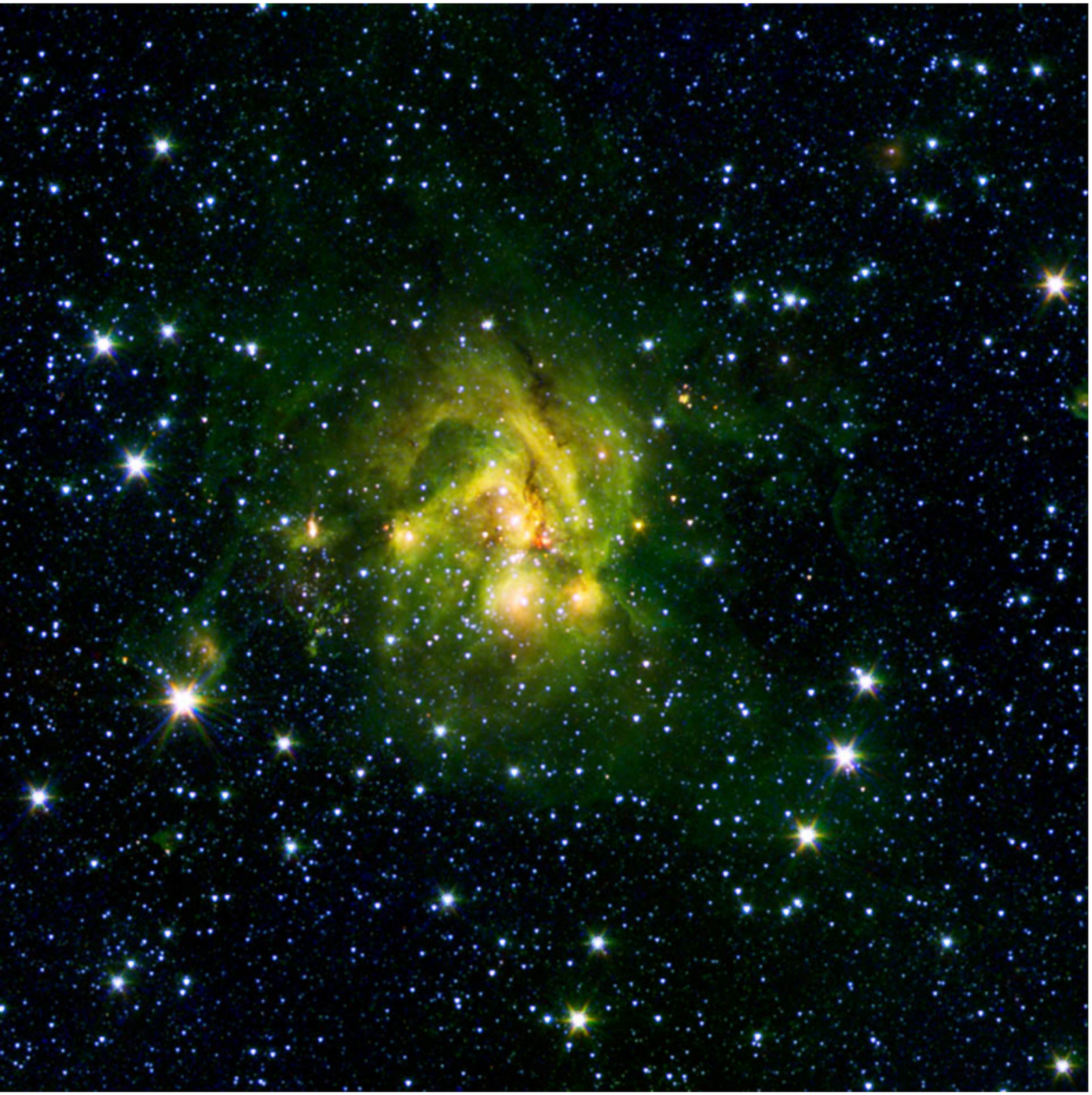
The protostar on the HR diagram





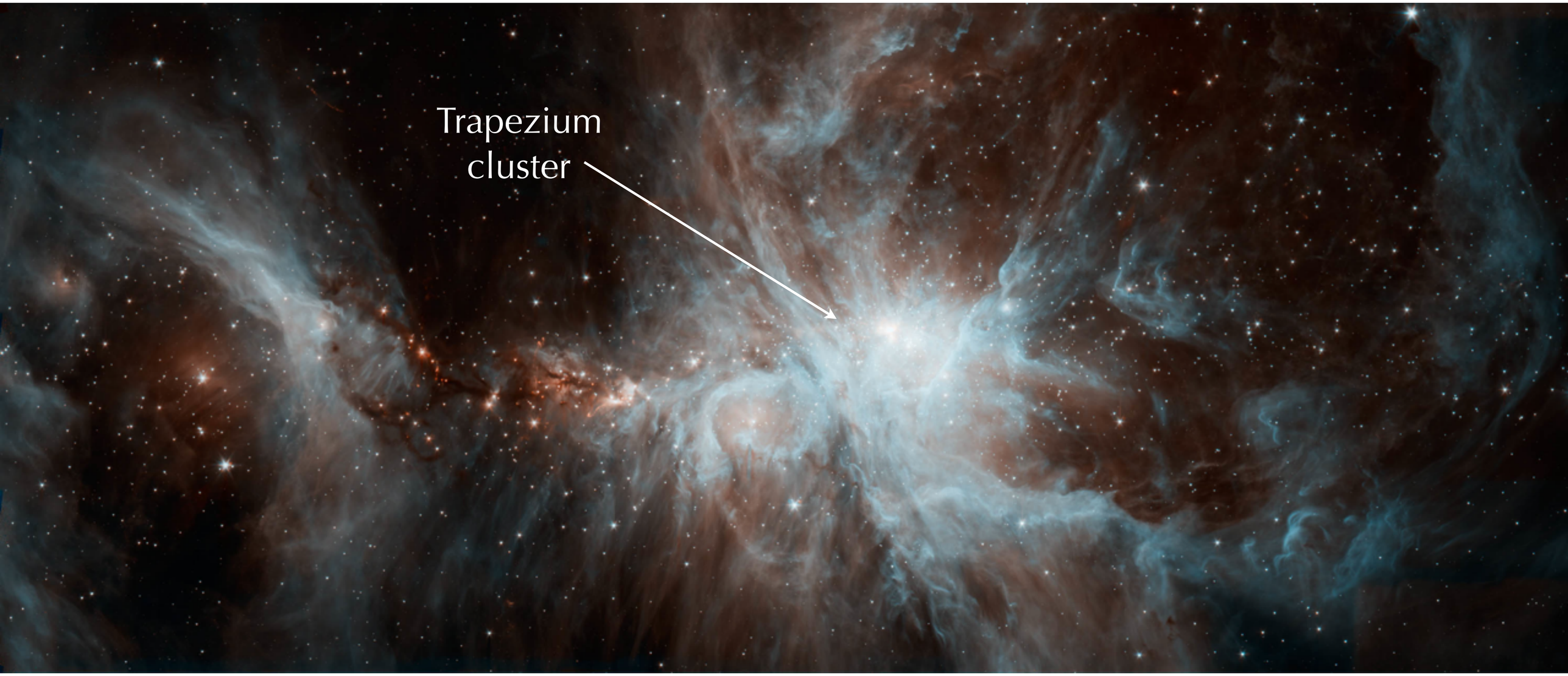
NASA/JPL-Caltech/2MASS/B. Whitney
(SSI/University of Wisconsin)

- Distant star forming region BG2107+49, 10 kpc away
- Spitzer Space Telescope + 2MASS (Two Micron All Sky Survey)
- Star formation triggers more star formation
- Red dots = young, forming stars cocooned in gas and dust



NASA/JPL-Caltech/2MASS/B. Whitney
(SSI/University of Wisconsin)

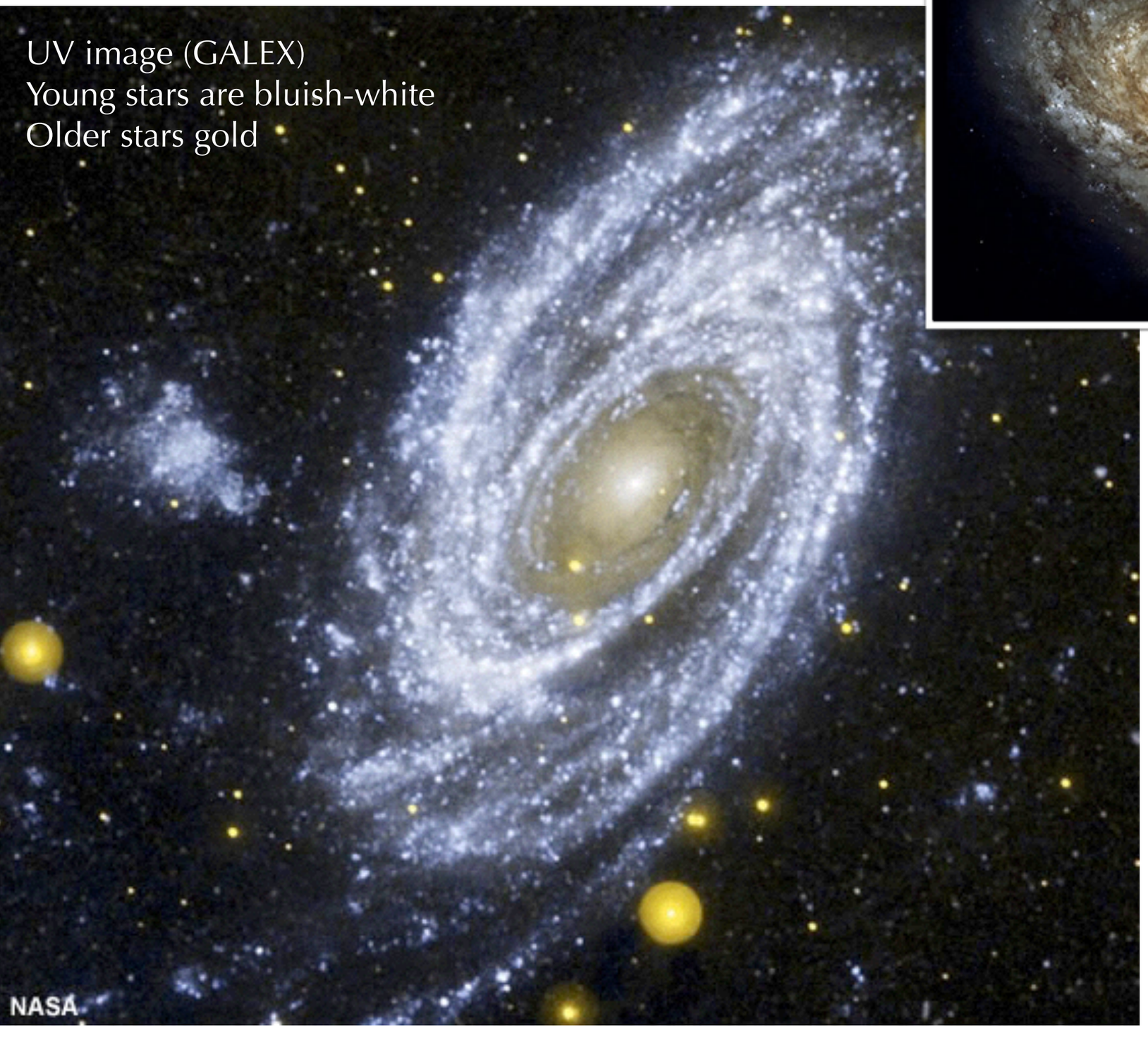
- “Shocked outflows”
- Gas outflow from a new star runs into the surrounding interstellar medium
- Spitzer Space Telescope + 2MASS (Two Micron All Sky Survey)

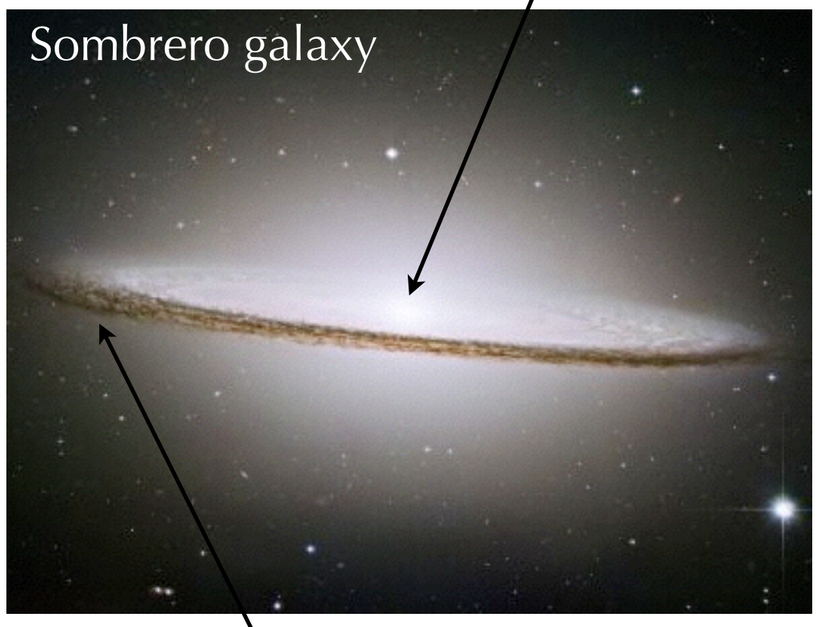


NASA/JPL-Caltech/J. Stauffer
(SSC/Caltech)

- Spitzer Space Telescope: Star formation in the Orion nebula
- Radiation and wind from massive stars blows away gas and dust

Where do stars form?

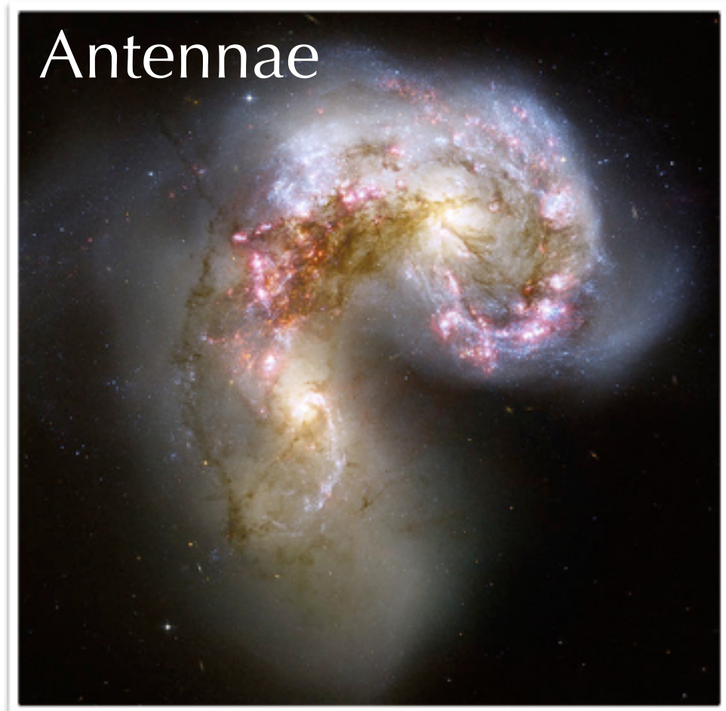




- Stars form in galactic disks
- Sun is a disk star
- Star formation concentrated in spiral arms

Star formation in galaxies

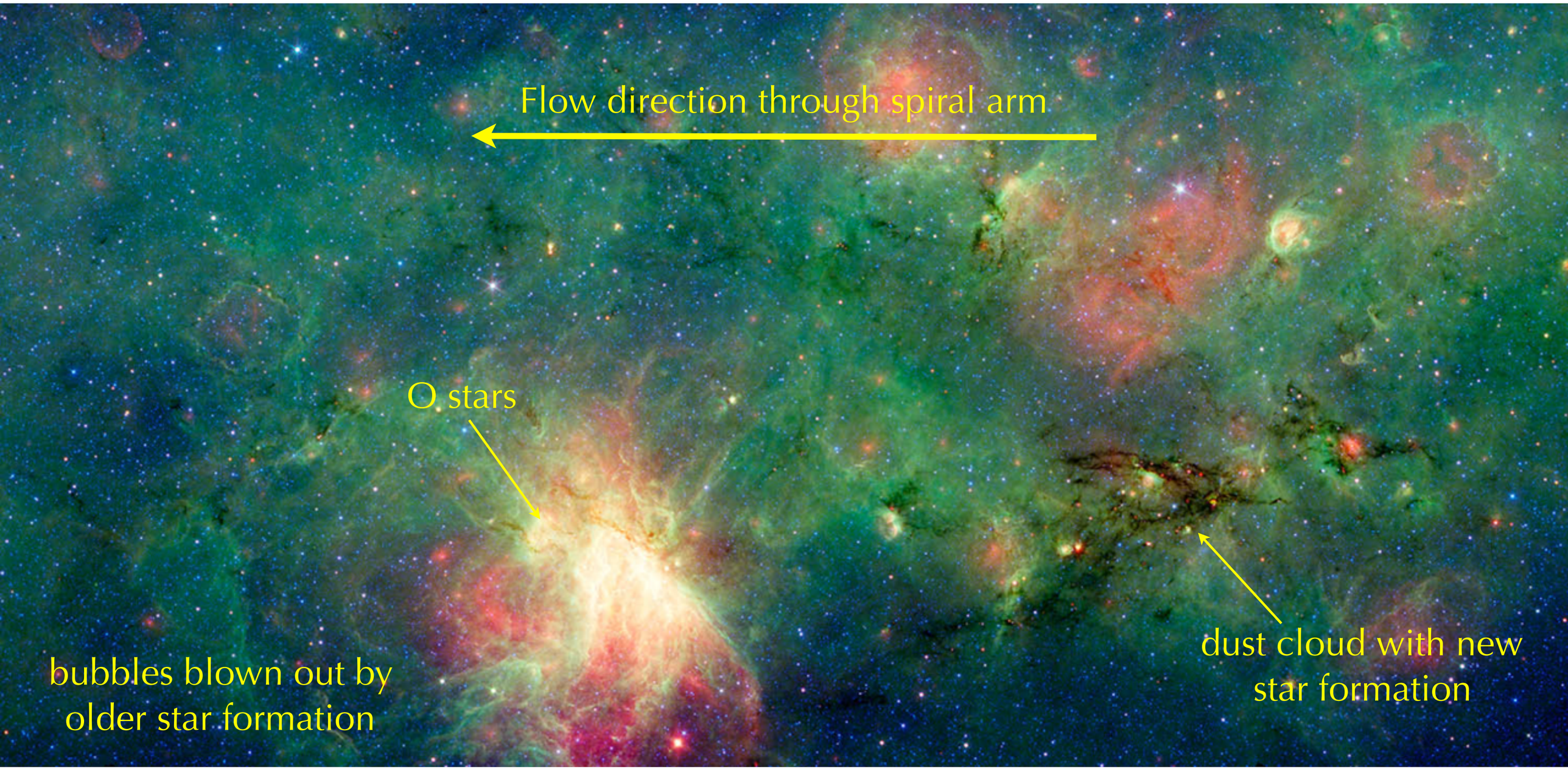
UV image from GALEX satellite



NASA, ESA, and the Hubble Heritage Team (STScI/ AURA)-ESA/Hubble Collaboration

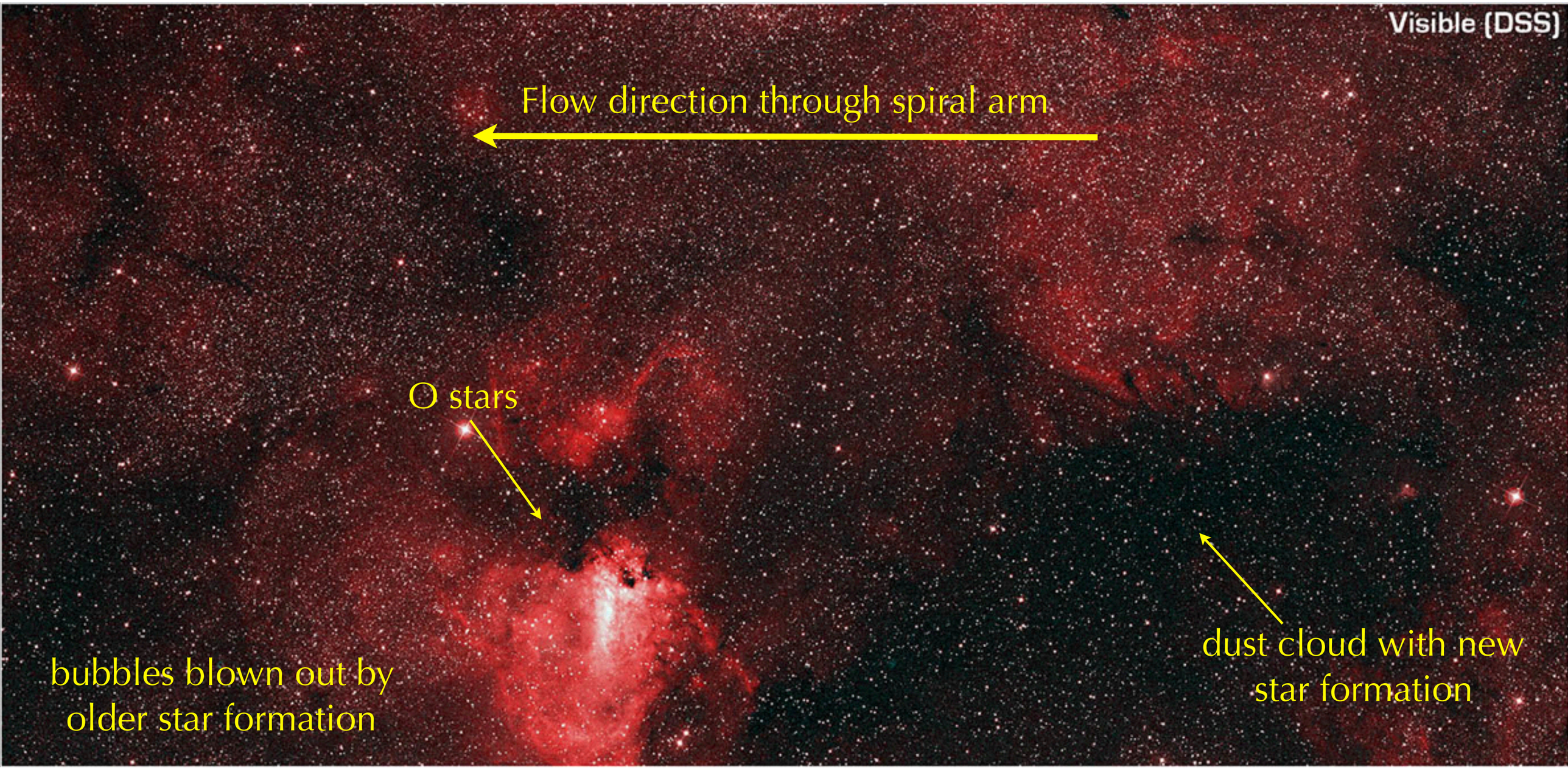
NASA, ESA and the Hubble Heritage Team STScI/AURA). Acknowledgment: J. Gallagher (University of Wisconsin), M. Mountain (STScI) and P. Puxley (NSF)

starbursts triggered by galaxy-galaxy collisions



Spitzer Space Telescope: Star formation in the M17 nebula

NASA/JPL-Caltech/
M. Povich (Penn State Univ.)



Spitzer Space Telescope: Star formation in the M17 nebula

NASA/JPL-Caltech/
M. Povich (Penn State Univ.)