

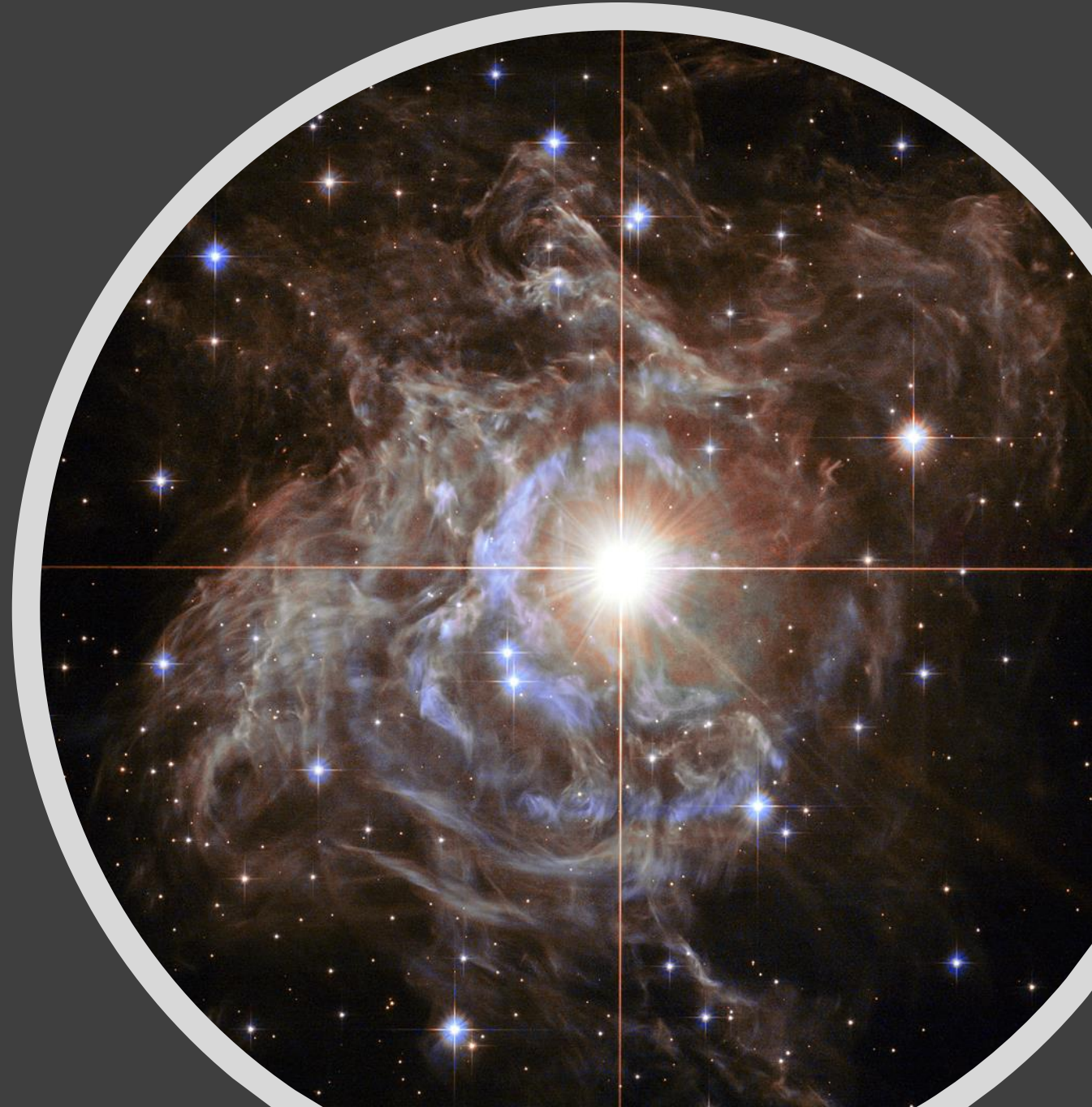
Oddball Stars

Stars with More Than What Meets the Eye

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ACTING DIRECTOR & OUTREACH ASTRONOMER,
VU DYER OBSERVATORY

THURSDAY, NOVEMBER 5, 2020

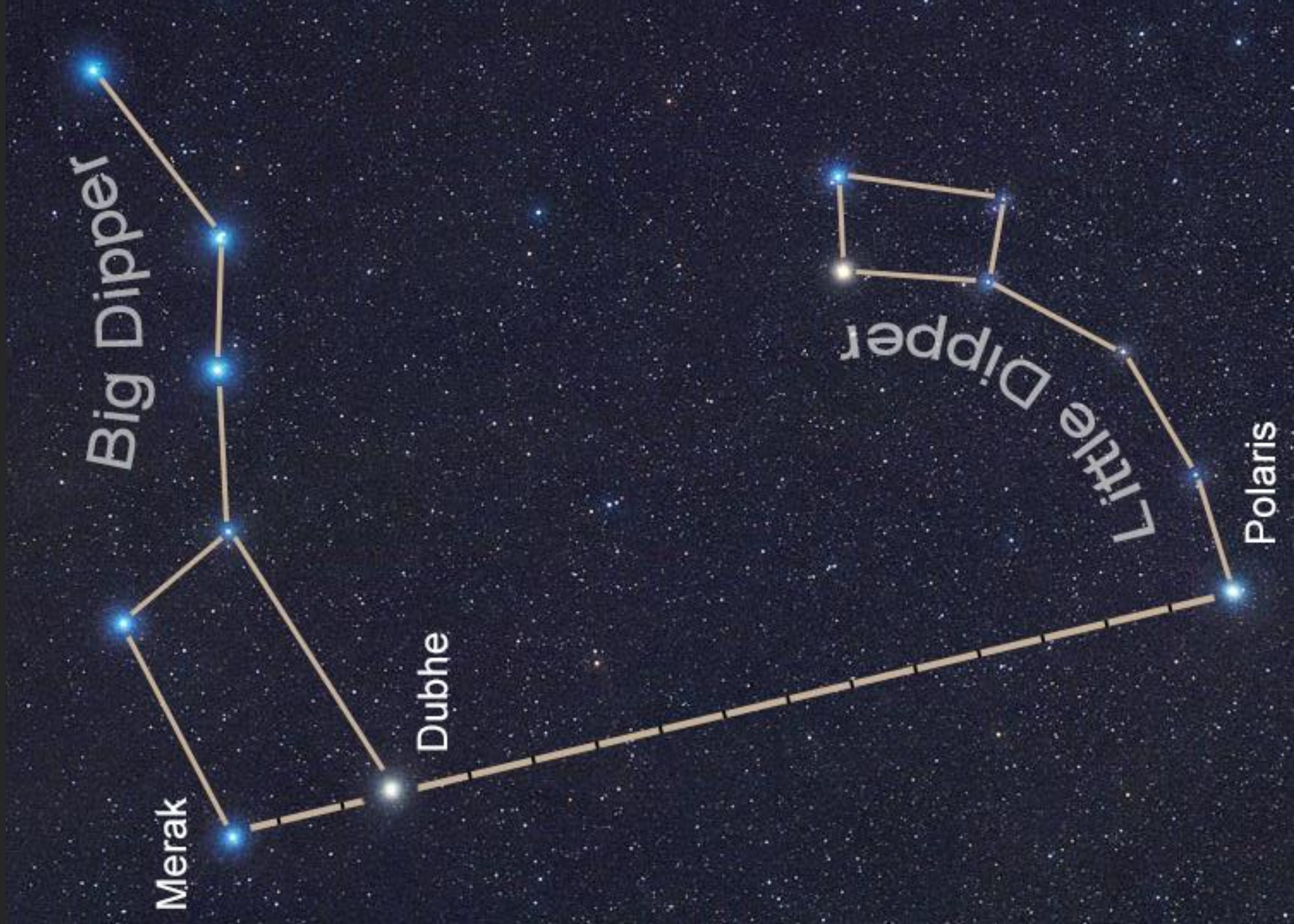




Polaris – The North Star

Image Credit: John Bova

Finding Polaris





Polaris is Circumpolar

- Not the brightest star
- Celestial pole is very near Polaris

Polaris – The “North Star”

- Located about 450 light-years away.
 - A trinary star system.
 - Brightest star is a Cepheid variable star.
-

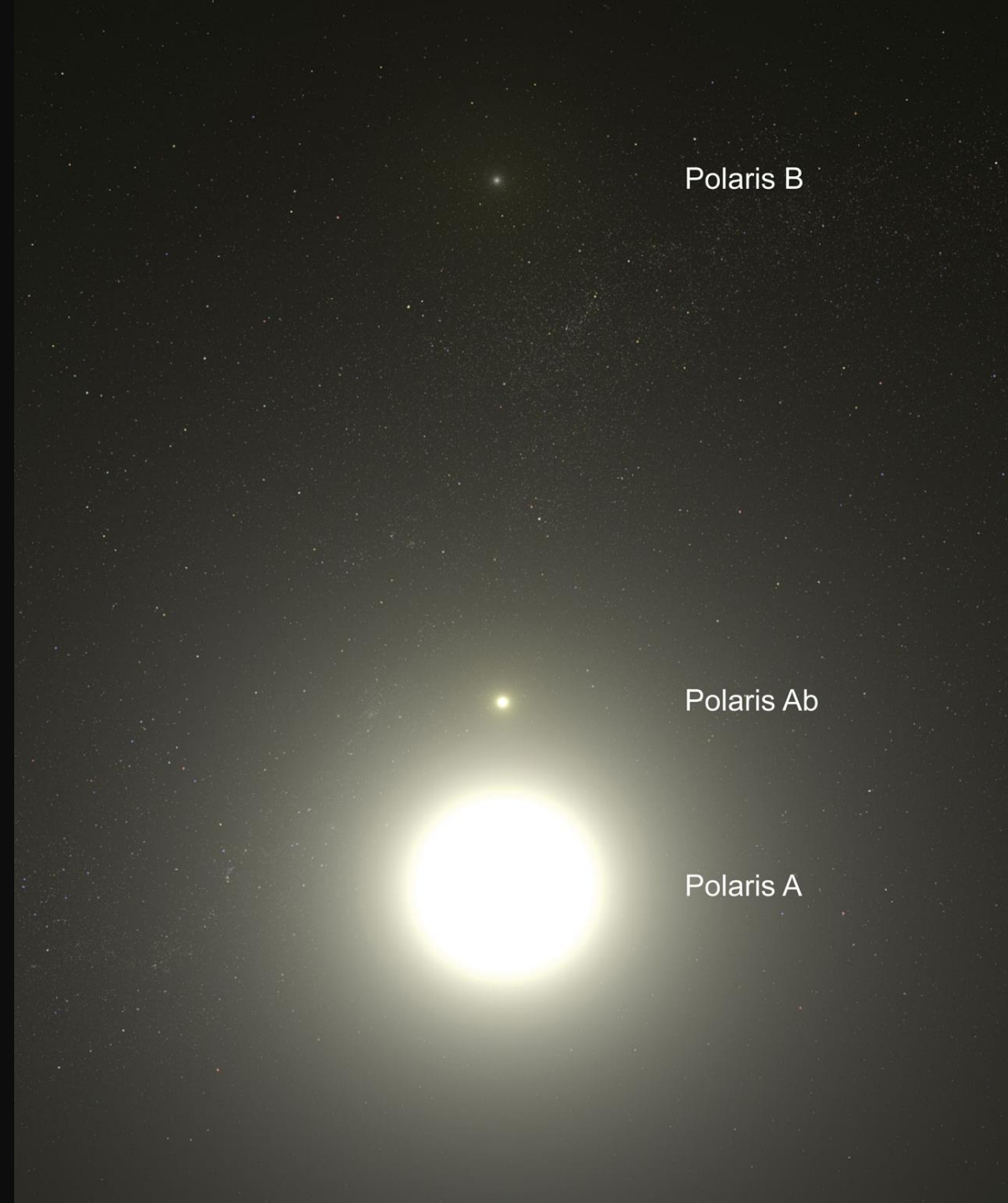


Image Credit: NASA/ESA/HST, G. Bacon (STScI)

Light Echoes from RS Puppis



www.spacetelescope.org

Polaris – The “North Star”

- Located about 450 light-years away.
 - A trinary star system.
 - Brightest star is a Cepheid variable star.
 - Two of the components are visible to a backyard telescope.
-

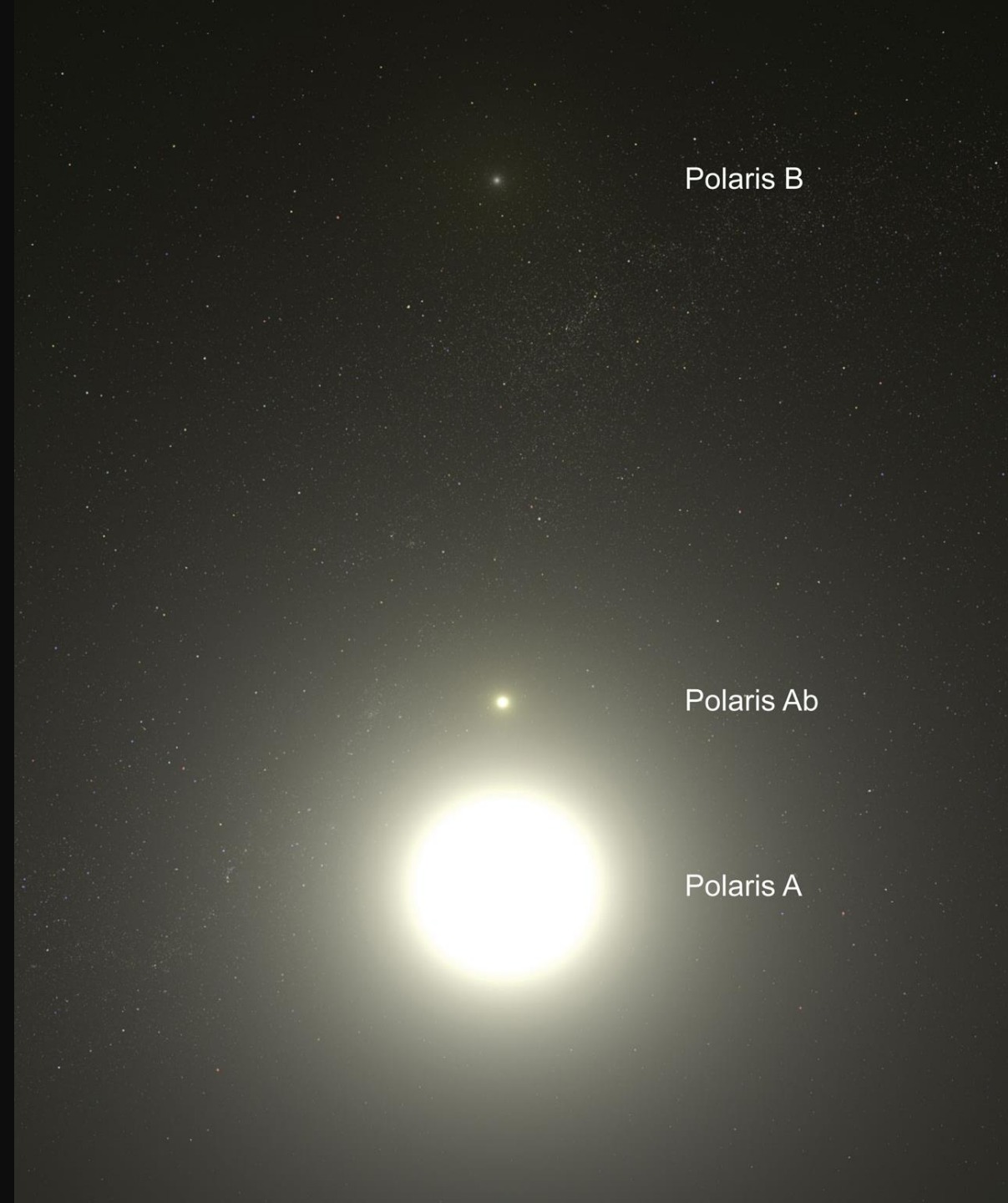


Image Credit: NASA/ESA/HST, G. Bacon (STScI)

The Doppler Effect



UNSHIFTED



REDSHIFTED



BLUESHIFTED

HST Resolves Polaris Ab

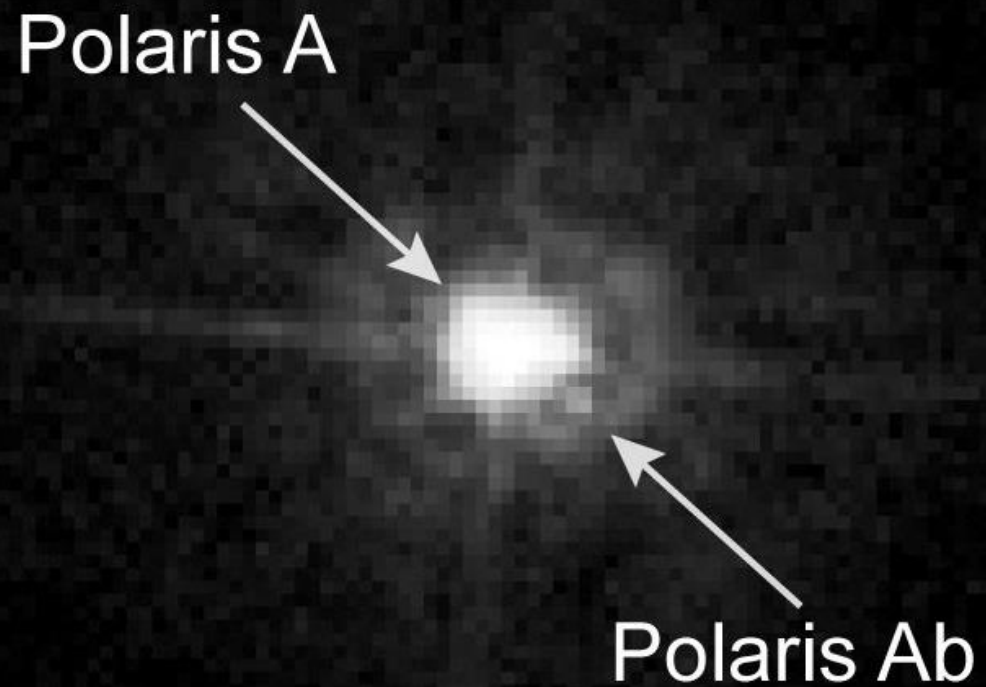


Image Credit: NASA, ESA, N. Evans (Harvard-Smithsonian CfA), and H. Bond (STScI)



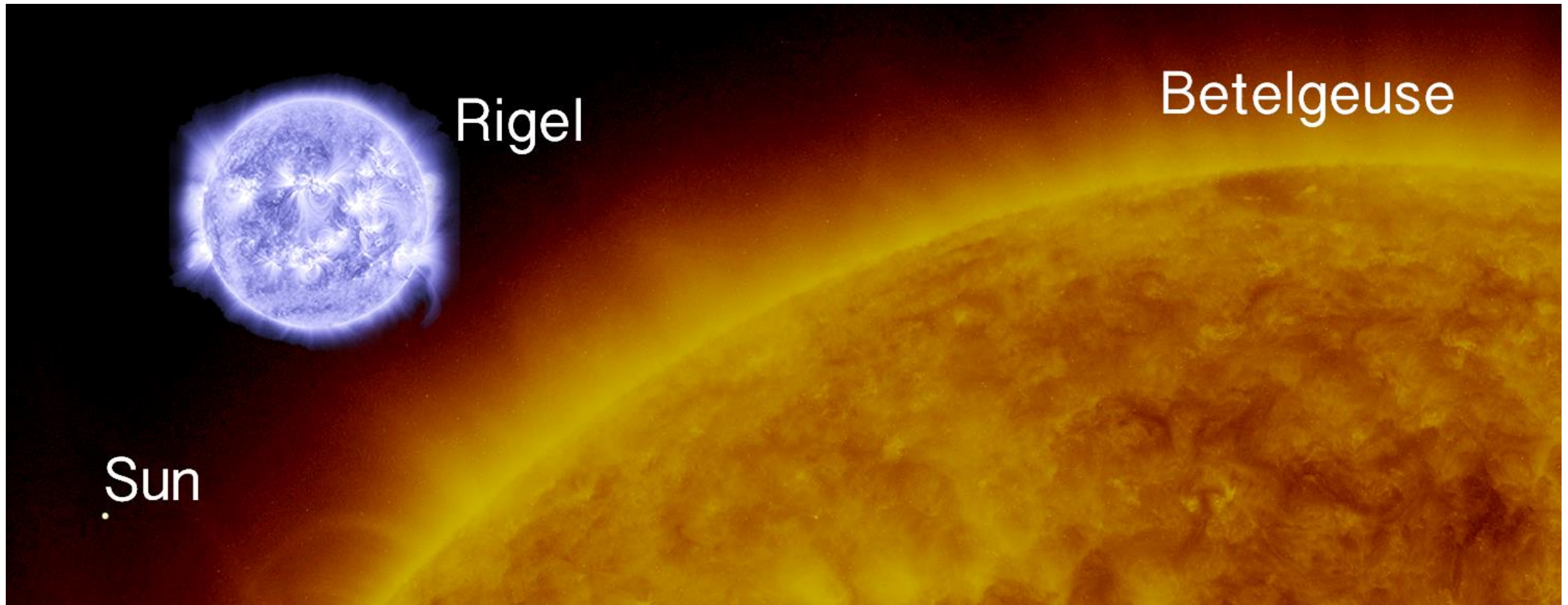
Betelgeuse

Image: ESO/Digitized Sky Survey 2

Orion



Credit: Babek Tafreshi, Nat Geo Image Collection

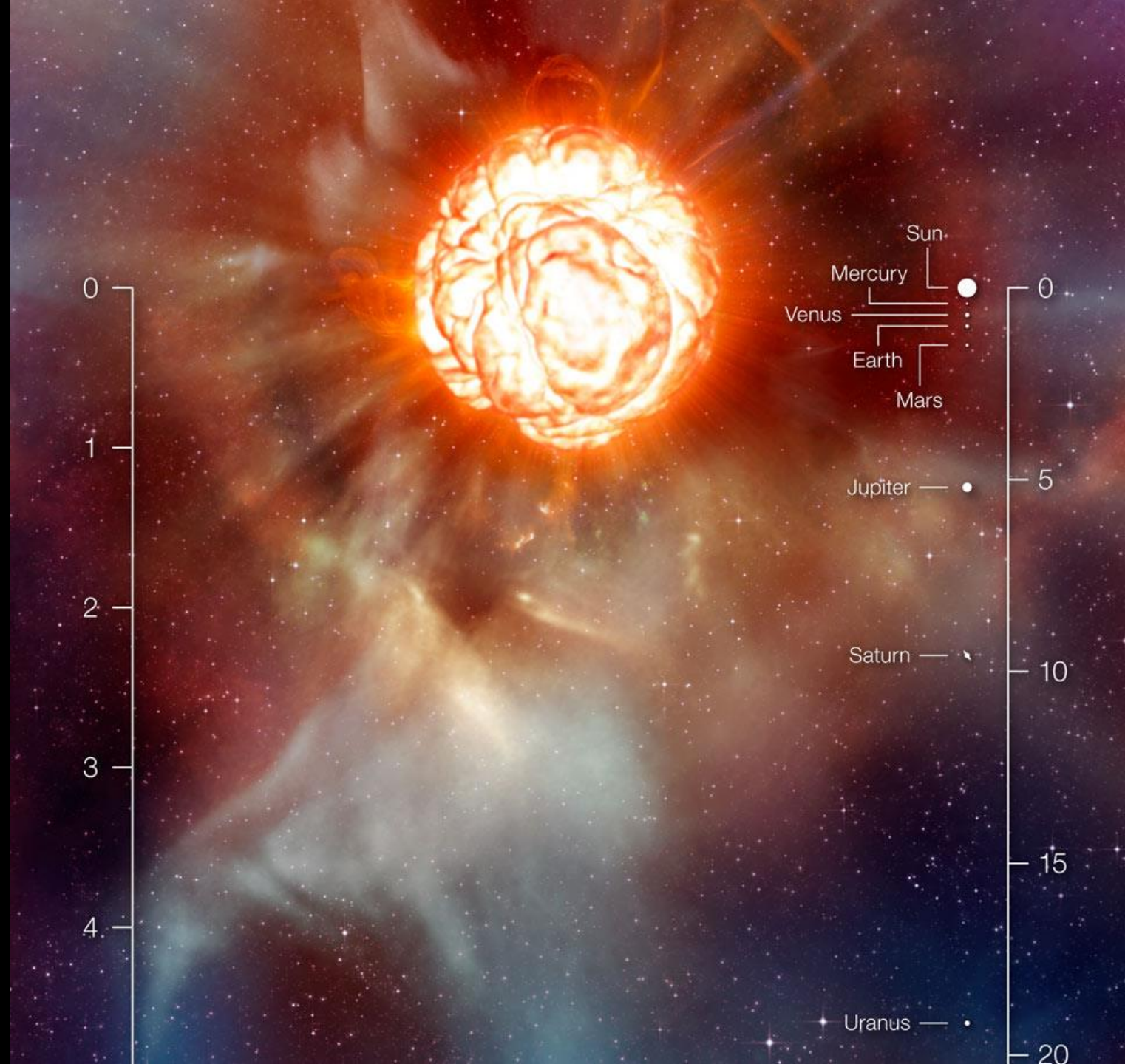


The Monstrous Betelgeuse |

Betelgeuse

- Diameter – the size of Jupiter's orbit ($\sim 700 - 850$ solar radii)
- Mass – 16-19 solar masses
- Luminosity $\sim 100,000$ solar luminosities
- Temperature – 3600 Kelvin
- Age – 8-8.5 million years
- Rotation period – 36 ± 8 years

Illustration Credit: ESO, L. Calçada



Betelgeuse

Local environment is
cluttered with dust and gas

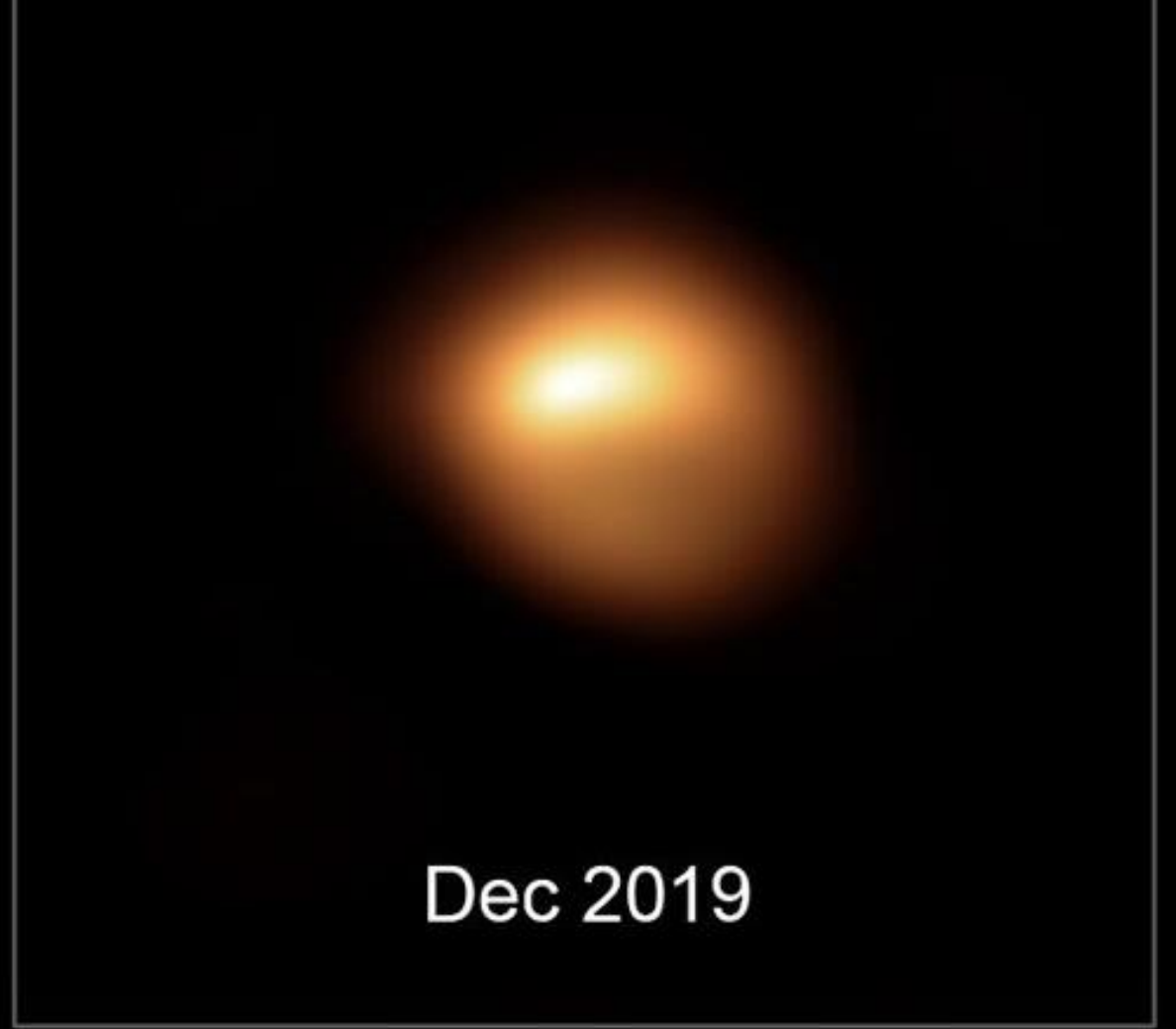
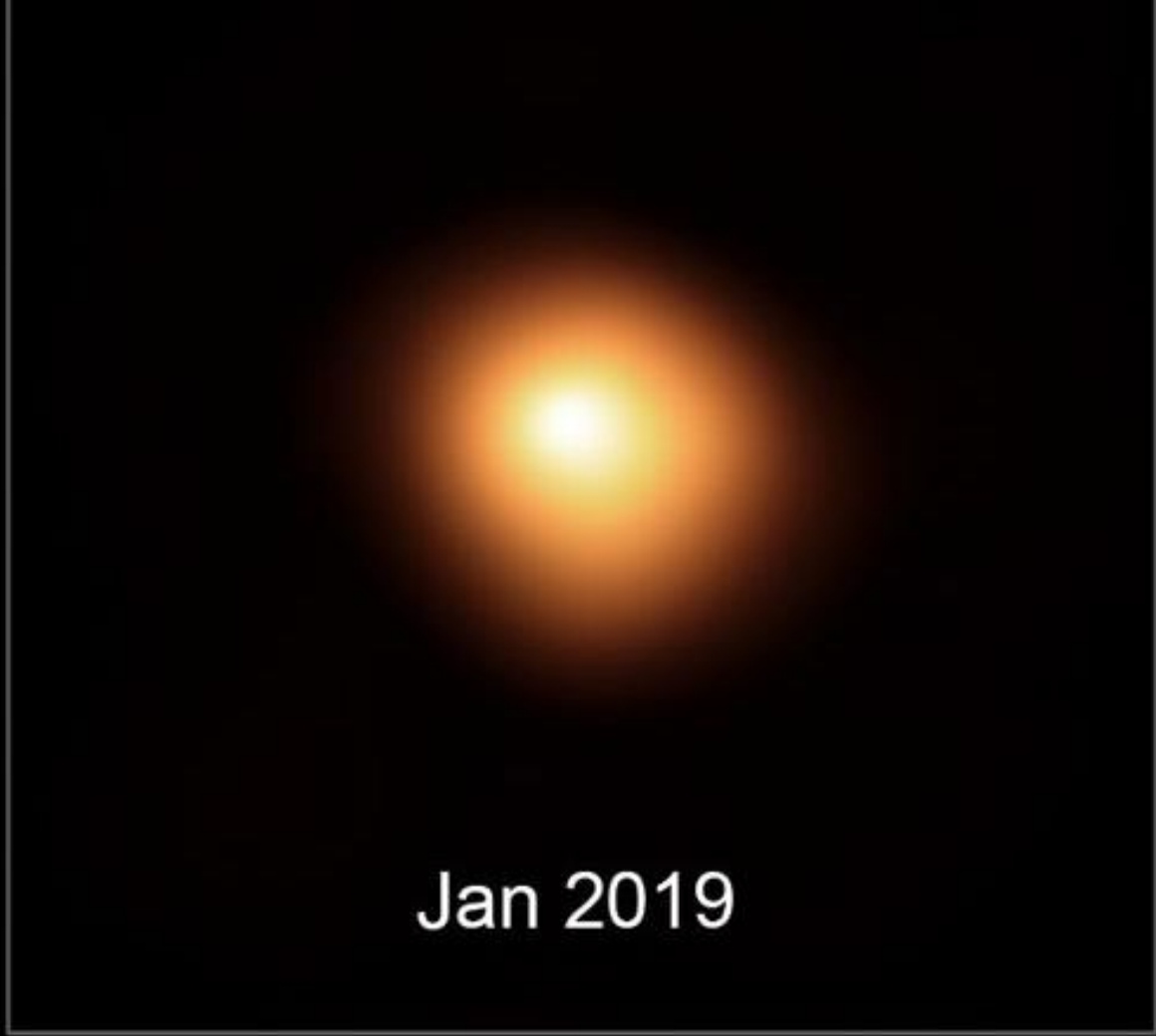
Image Credit: ESO/P. Kervella/M. Montargès et al.,
Acknowledgement: Eric Pantin



Betelgeuse's 2020 Dimming



Image Credits: H. Raab



Betelgeuse as seen from ESO's VLT

Image Credit: ESO, M. Montargès et al.

What caused Betelgeuse's Ominous Dimming?

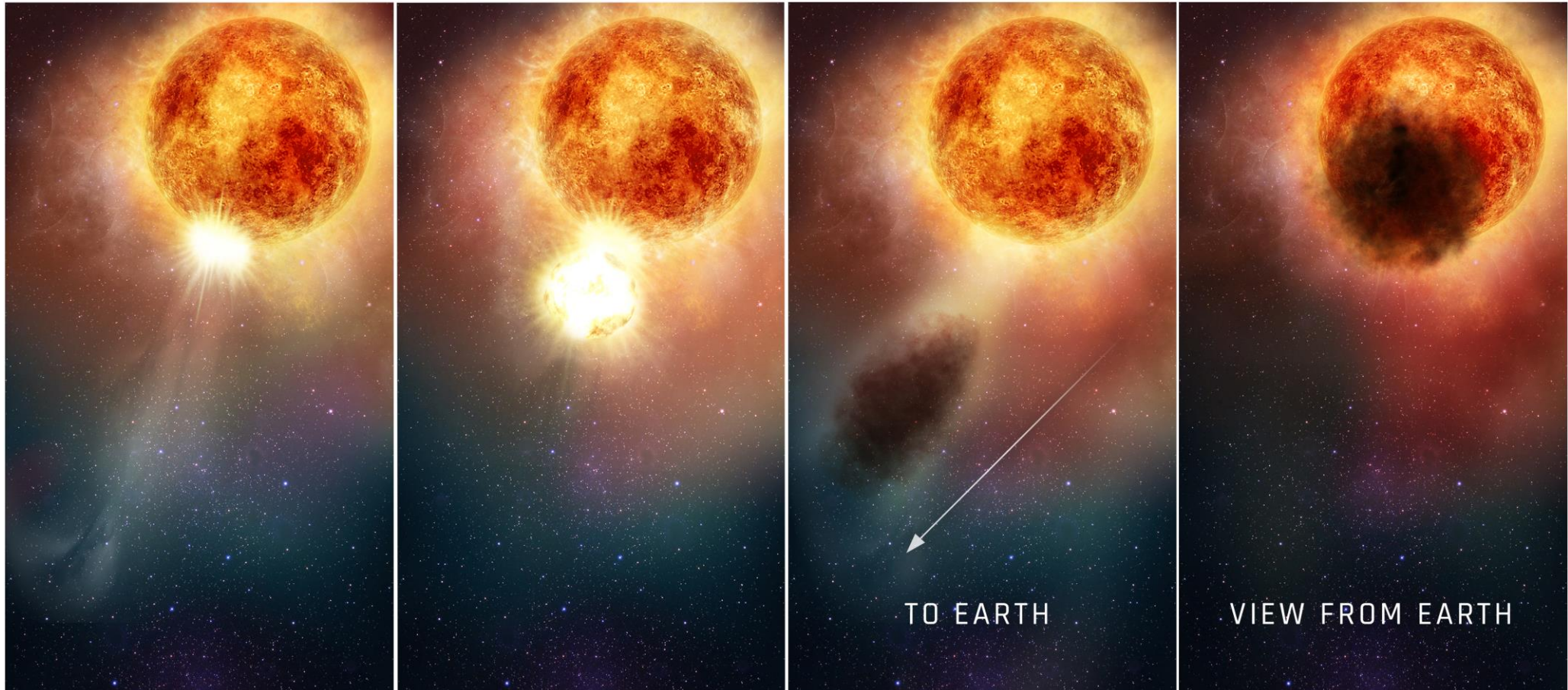


Illustration credit: NASA, ESA, and E. Wheatley (STScI)



Betelgeuse from ALMA

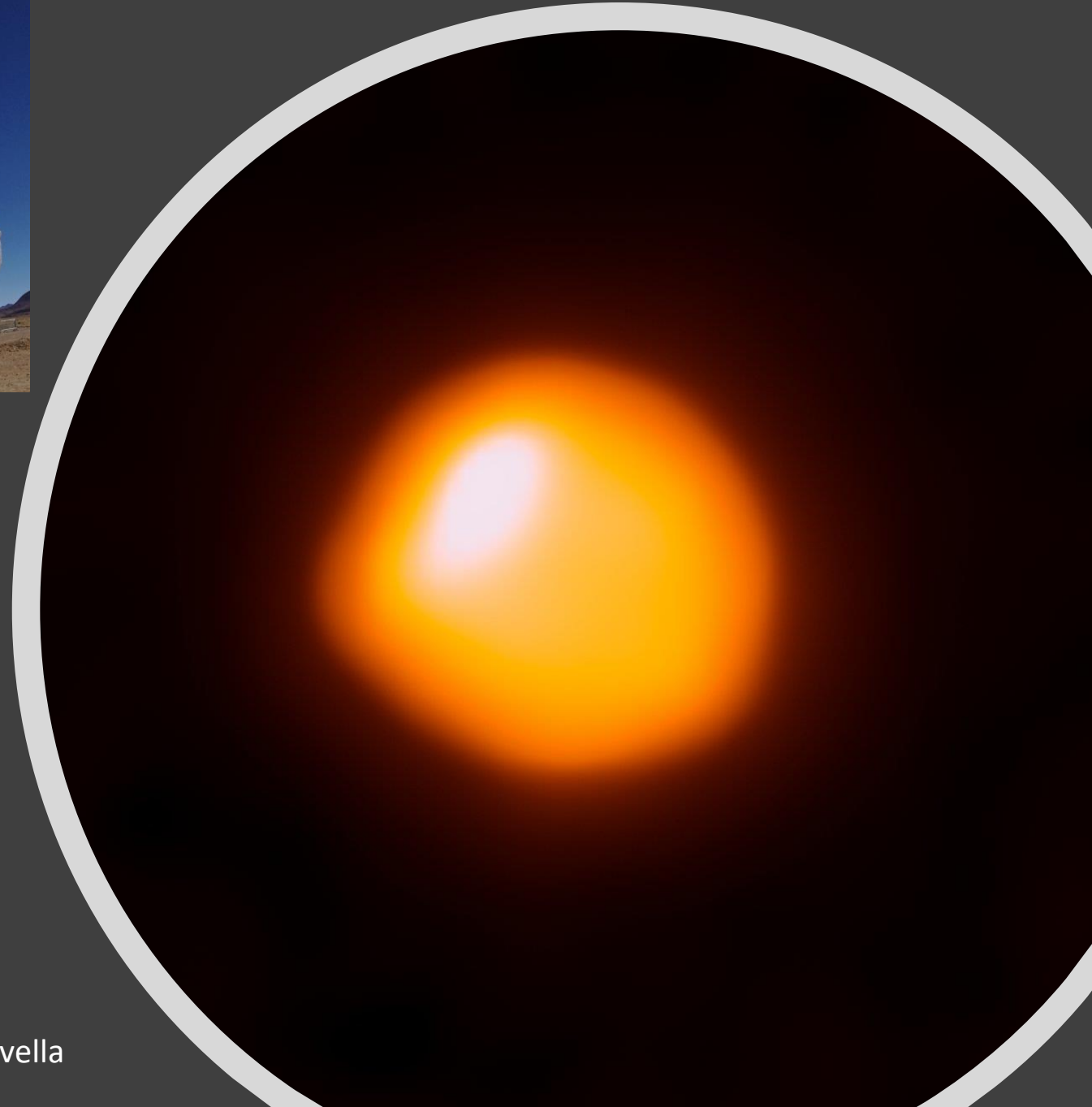
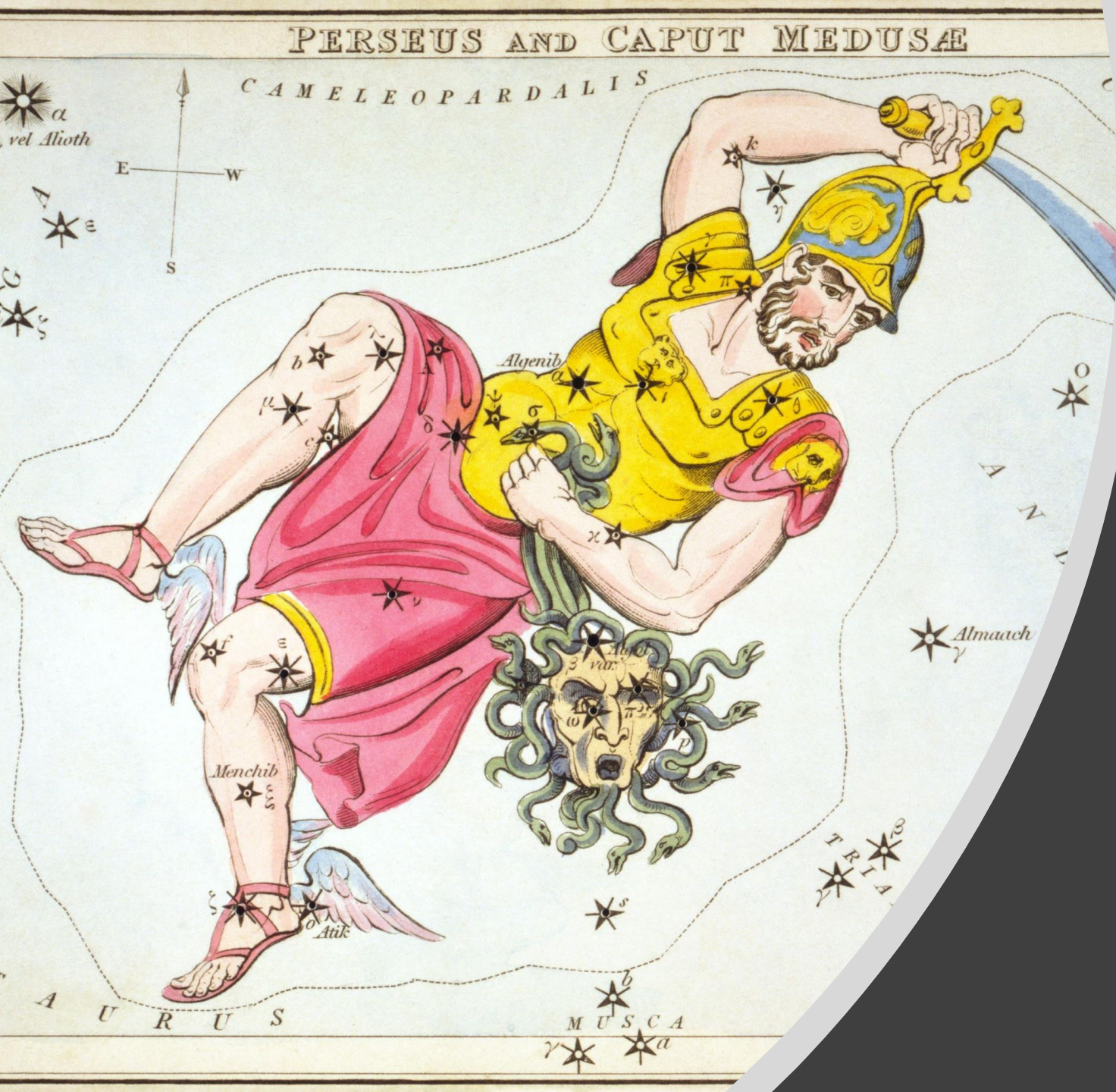


Image Credits: ESO; ALMA (ESO/NAOJ/NRAO)/E. O’Gorman/P. Kervella

Algol - β Persei



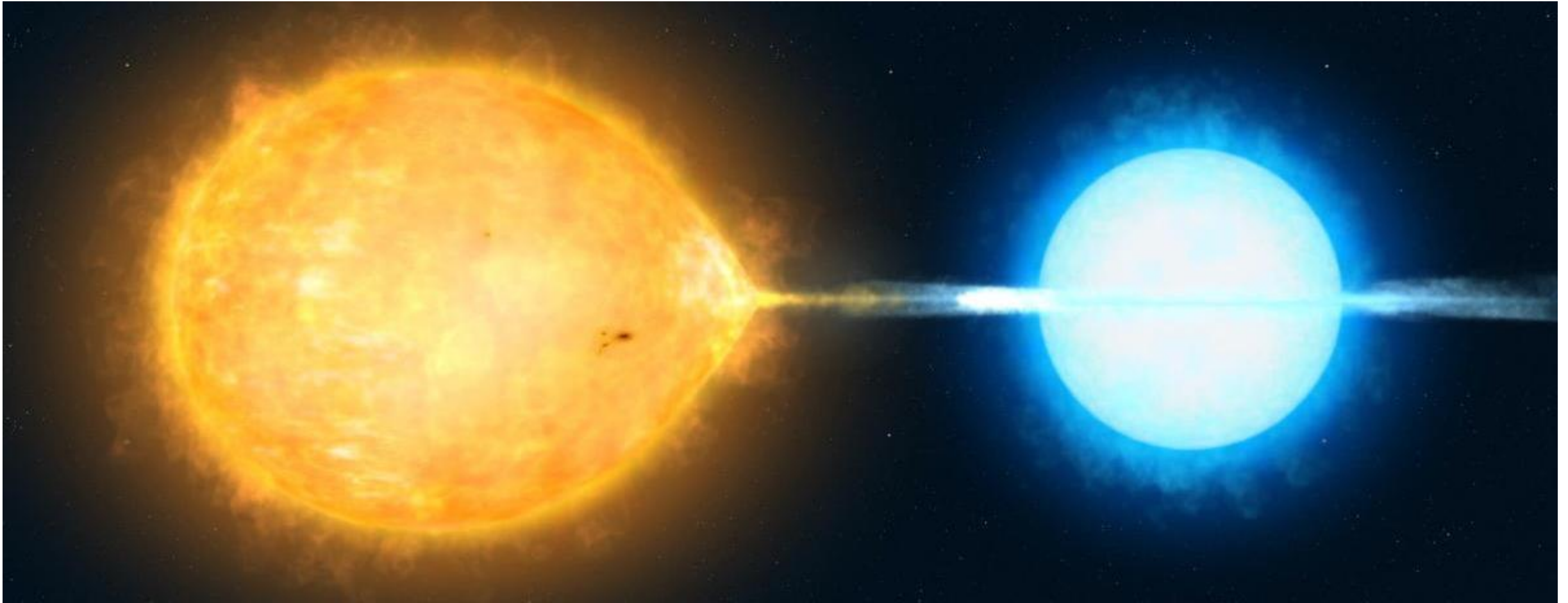


Perseus

Slayer of the Gorgon Medusa

Medusa's visage was fabled to be able to turn mortals to stone

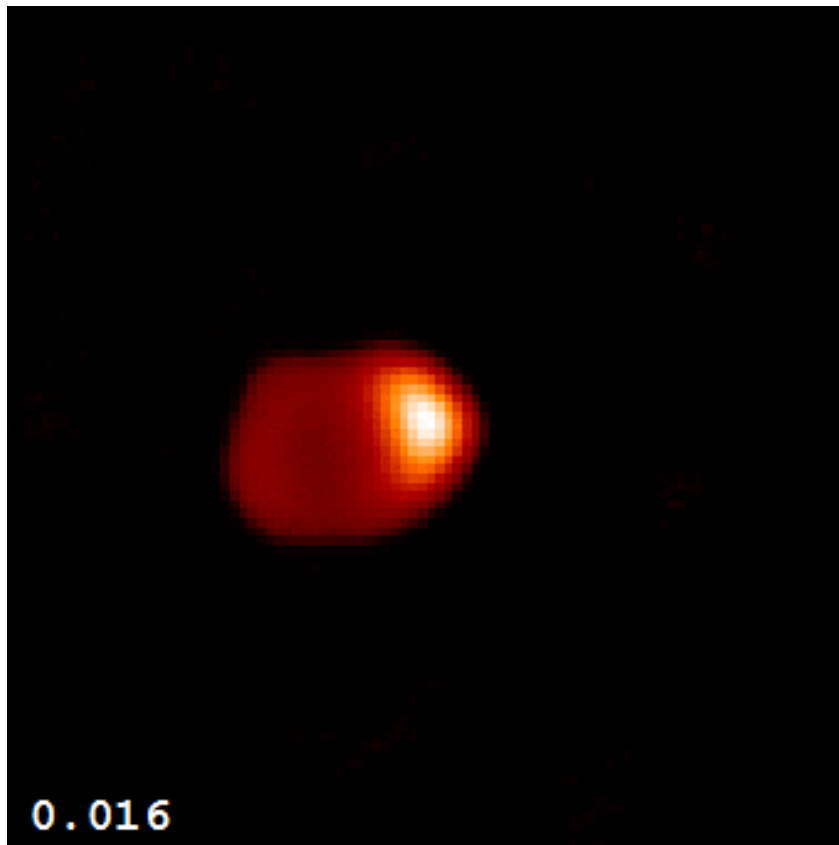
Algol, the "demon star," is said to be the winking eye of Medusa.



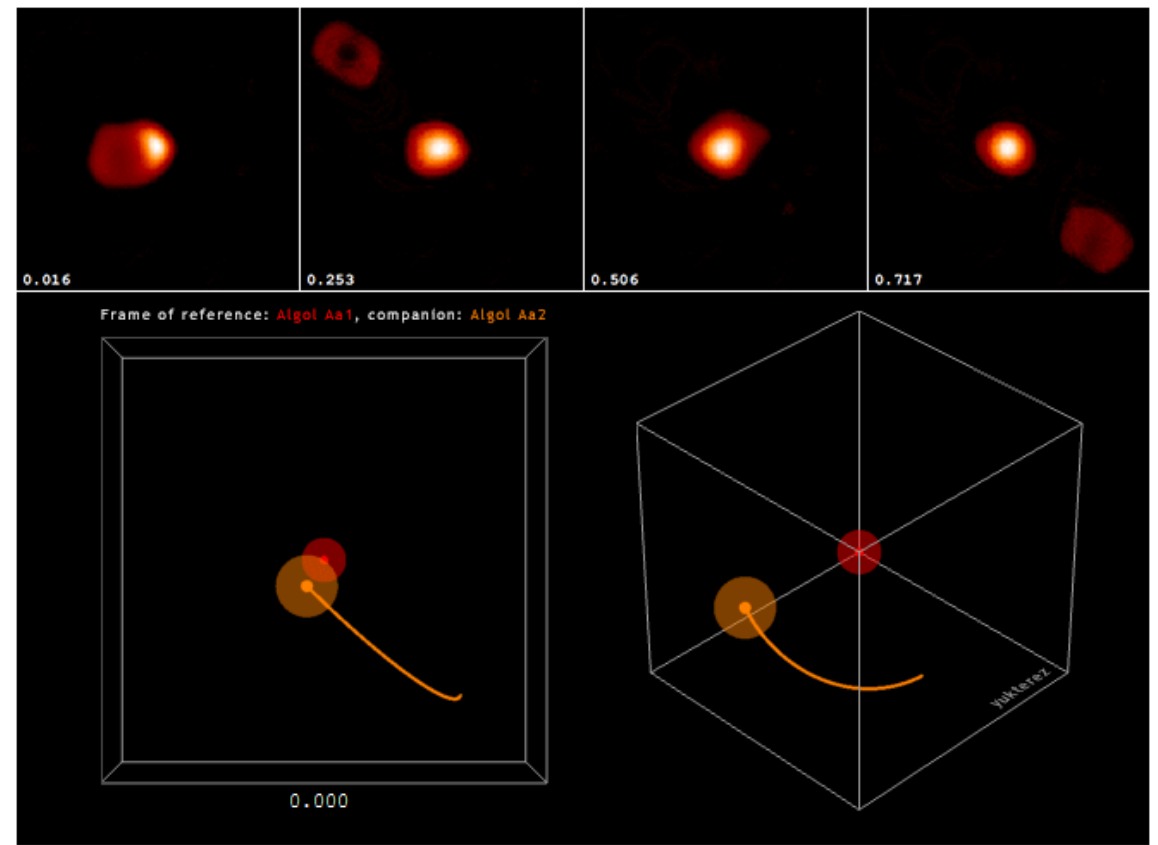
Algol – A Semi-Detached Binary

Credit: Mark Garlick/
SPL / Science Source

Observations of Algol



Credit: Dr Fabien Baron, Dept. of Astronomy, University of Michigan



Credit: Simon Tyran

Simulator

Vega

25 Light-years away in Lyra

Fifth-brightest star in the night sky

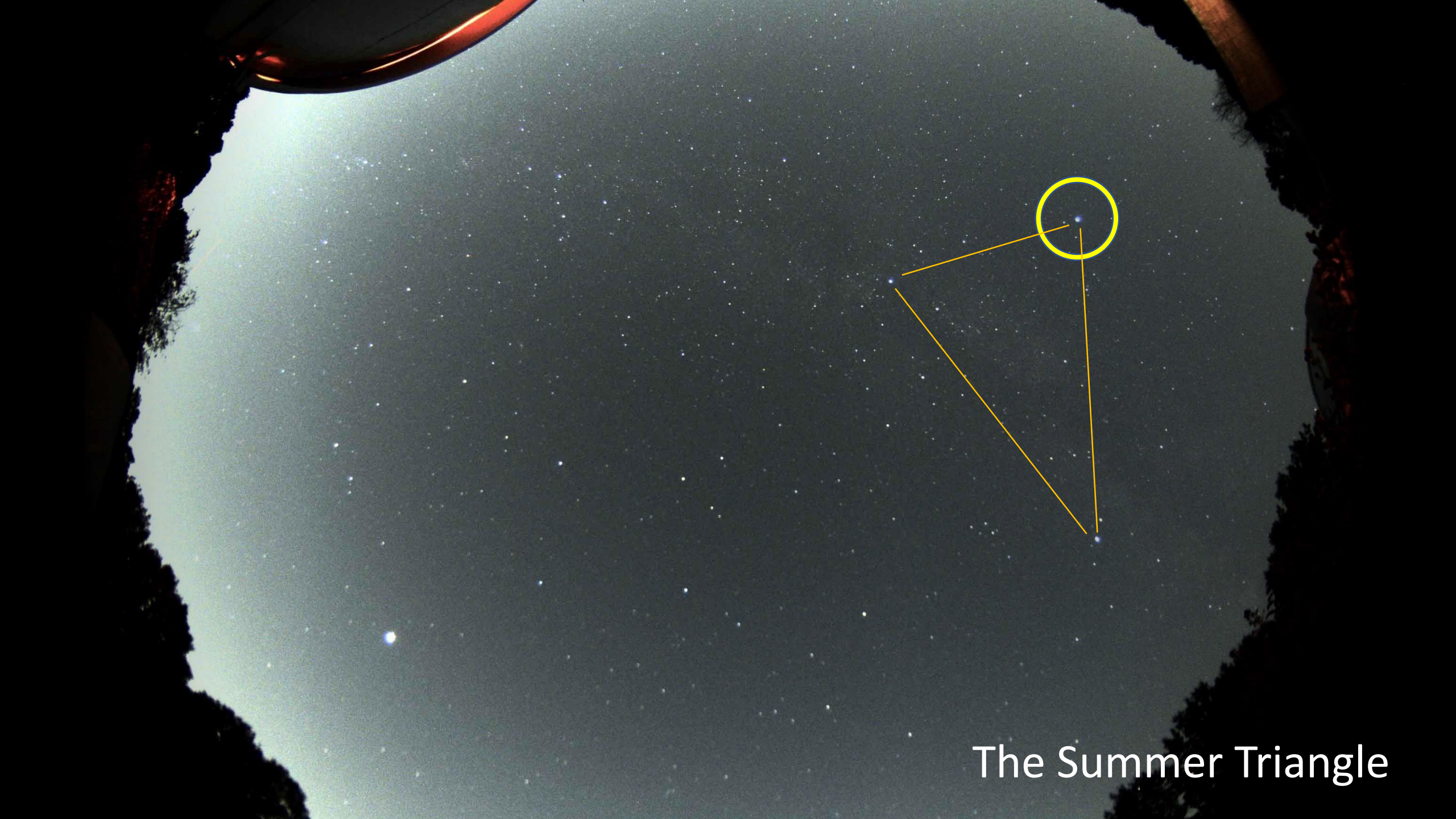
Comparison to Sun:

- ~ 2x as massive
- ~ 2x as wide
- ~ 2x as hot
- ~ 40 times as luminous





Made Famous by *Contact*



The Summer Triangle

Vega Served as the Calibrator for the Magnitude Scale

- **Apparent Magnitude** - Measurement of how bright an object appears.
- Magnitudes follow an inverse logarithmic scale (bigger number is fainter):
 - Sun = -26.7
 - Full Moon = -12.7
 - Venus (at max) = -4.2
 - Sirius = -1.46
 - Faintest naked-eye star $\sim +6$ to $+7$ (note positive value)
 - Faintest object seen by HST $\sim +30$

Vega – Our Future North Star

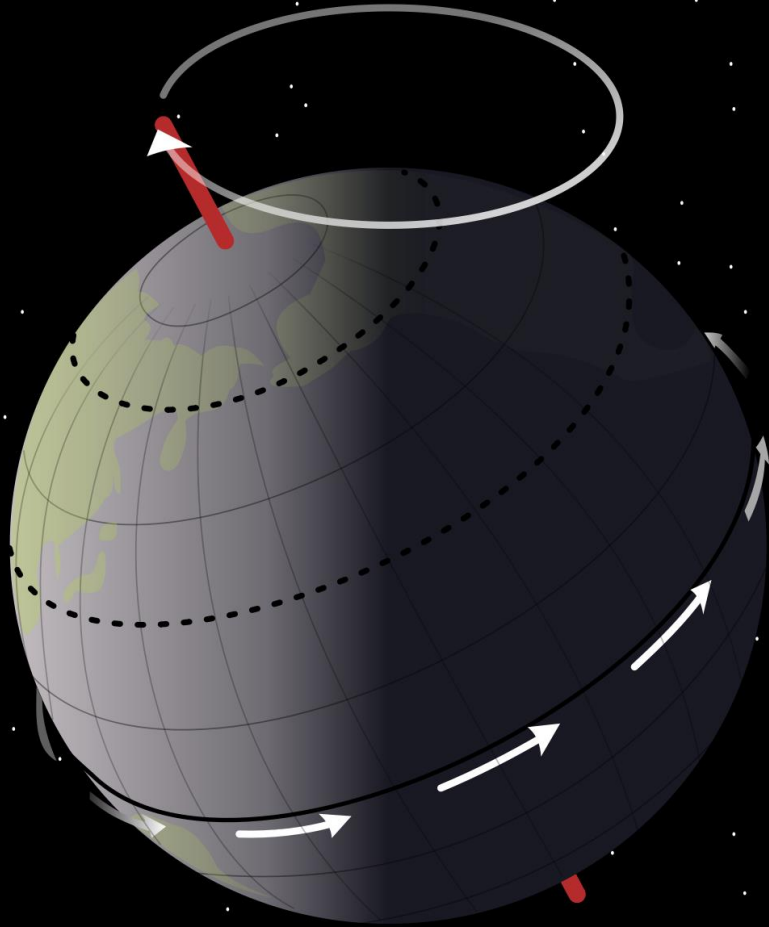


Image Source: Wikipedia

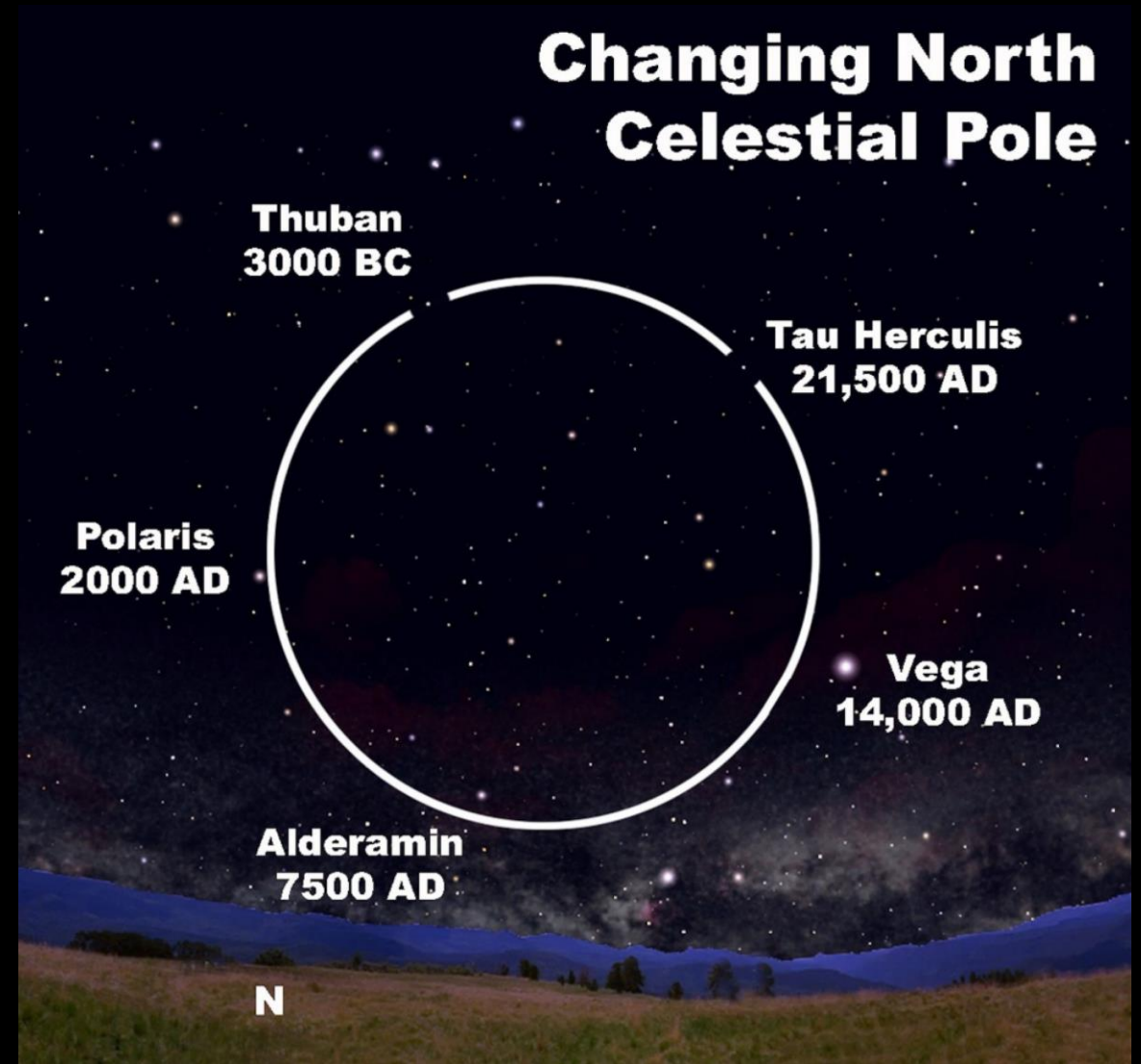


Image Credit: Dennis Mammana illustration / creators.com)

New Views of Vega



as viewed from
a planet around Vega



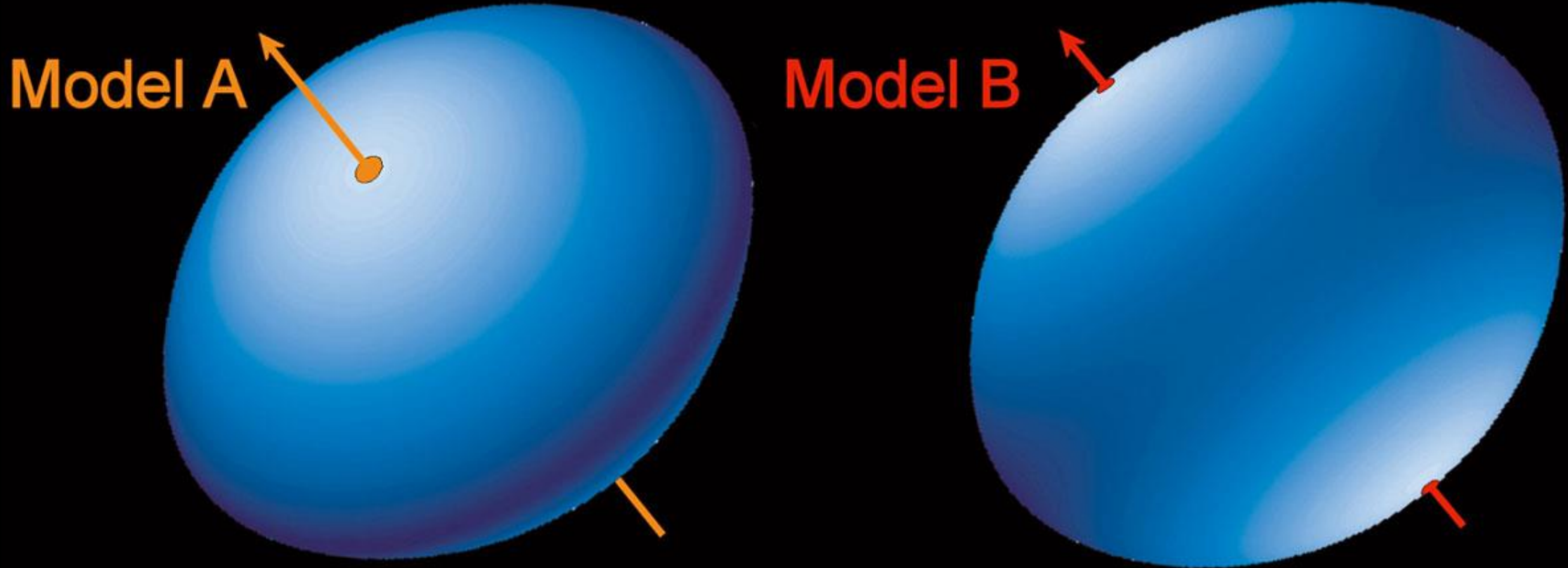
the Sun

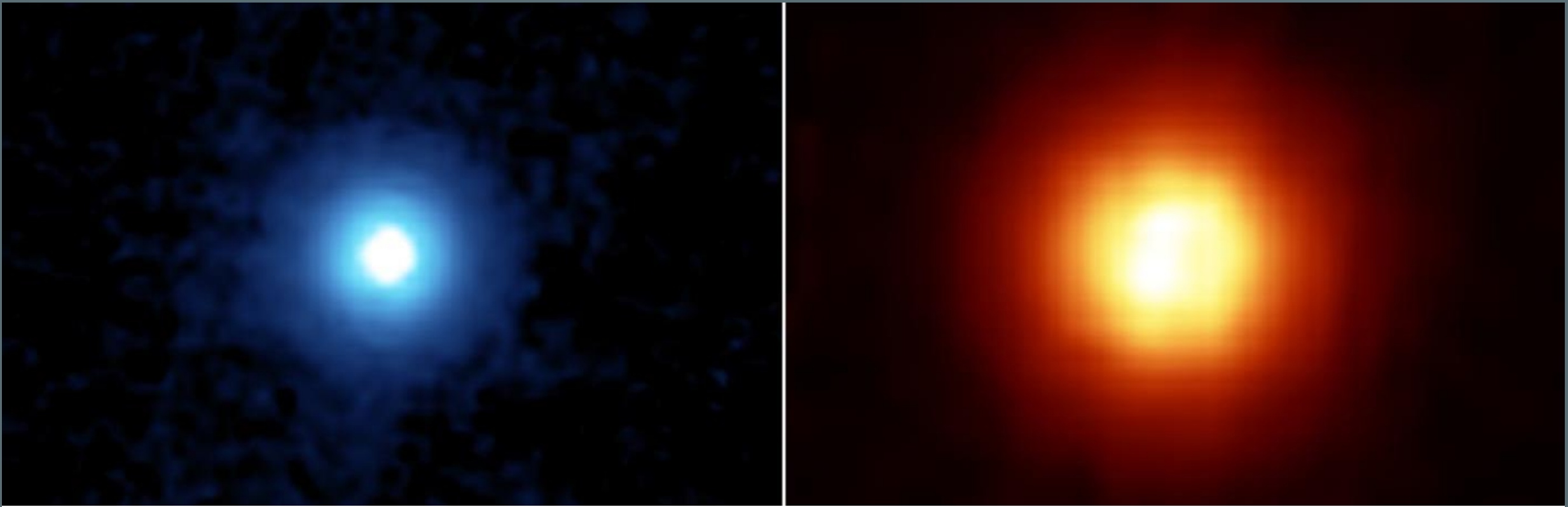


our view
from Earth

Credit: John Monnier (U. Michigan)

Vega's Oblate Shape Makes It Appear Brighter





Vega – Infrared Excess

Credit: NASA / JPL-Caltech / K. Su