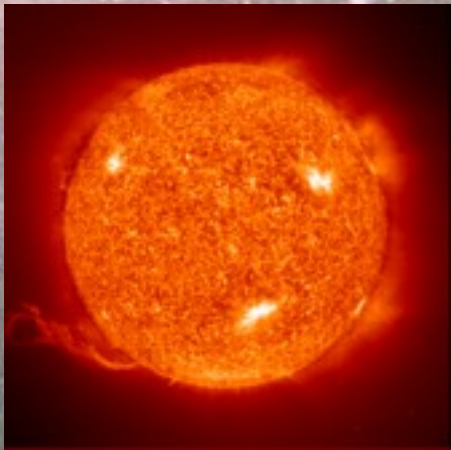
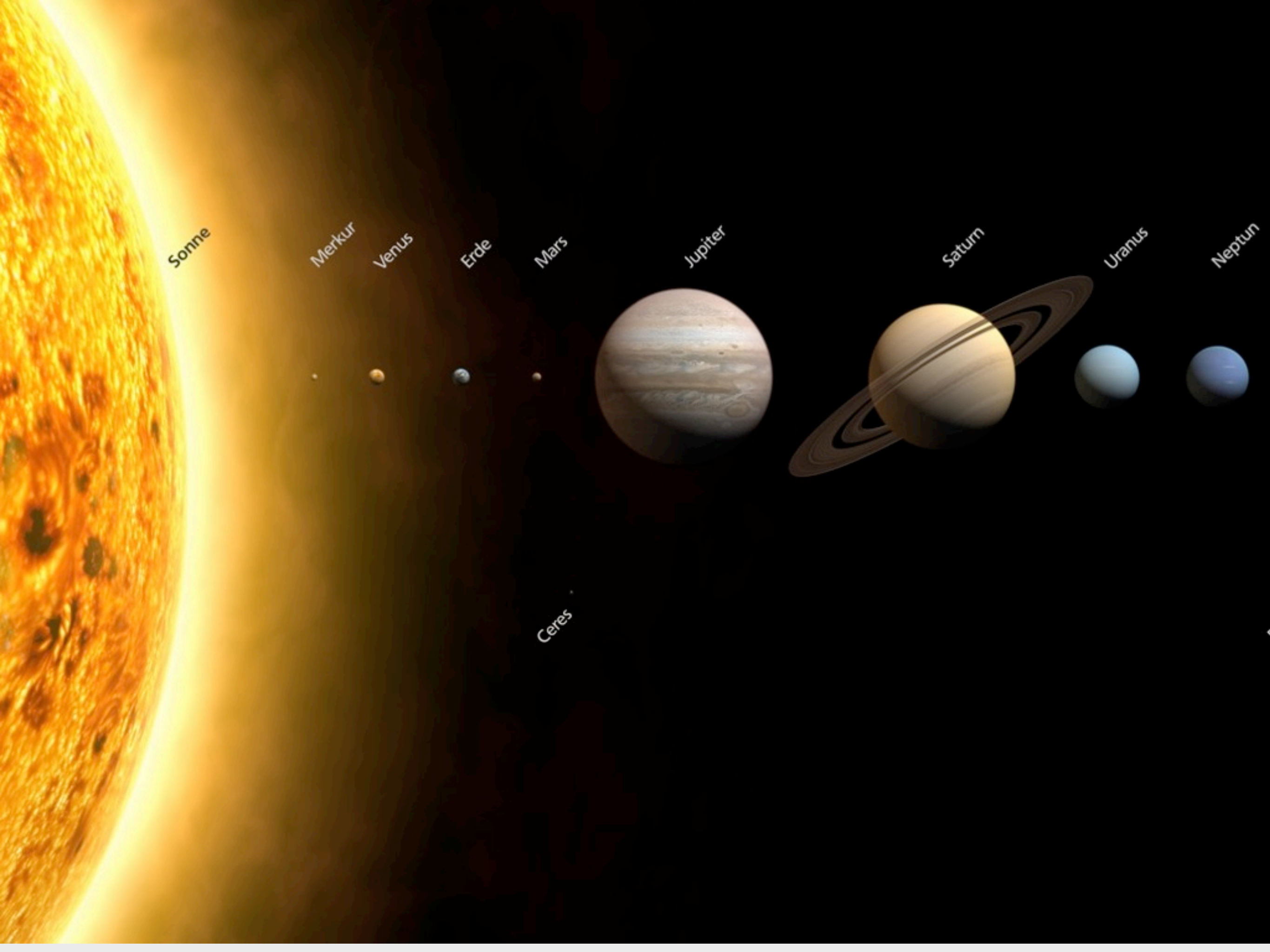




**Wie lange lebt ein
Stern?**







Sonne

Merkur

Venus

Erde

Mars

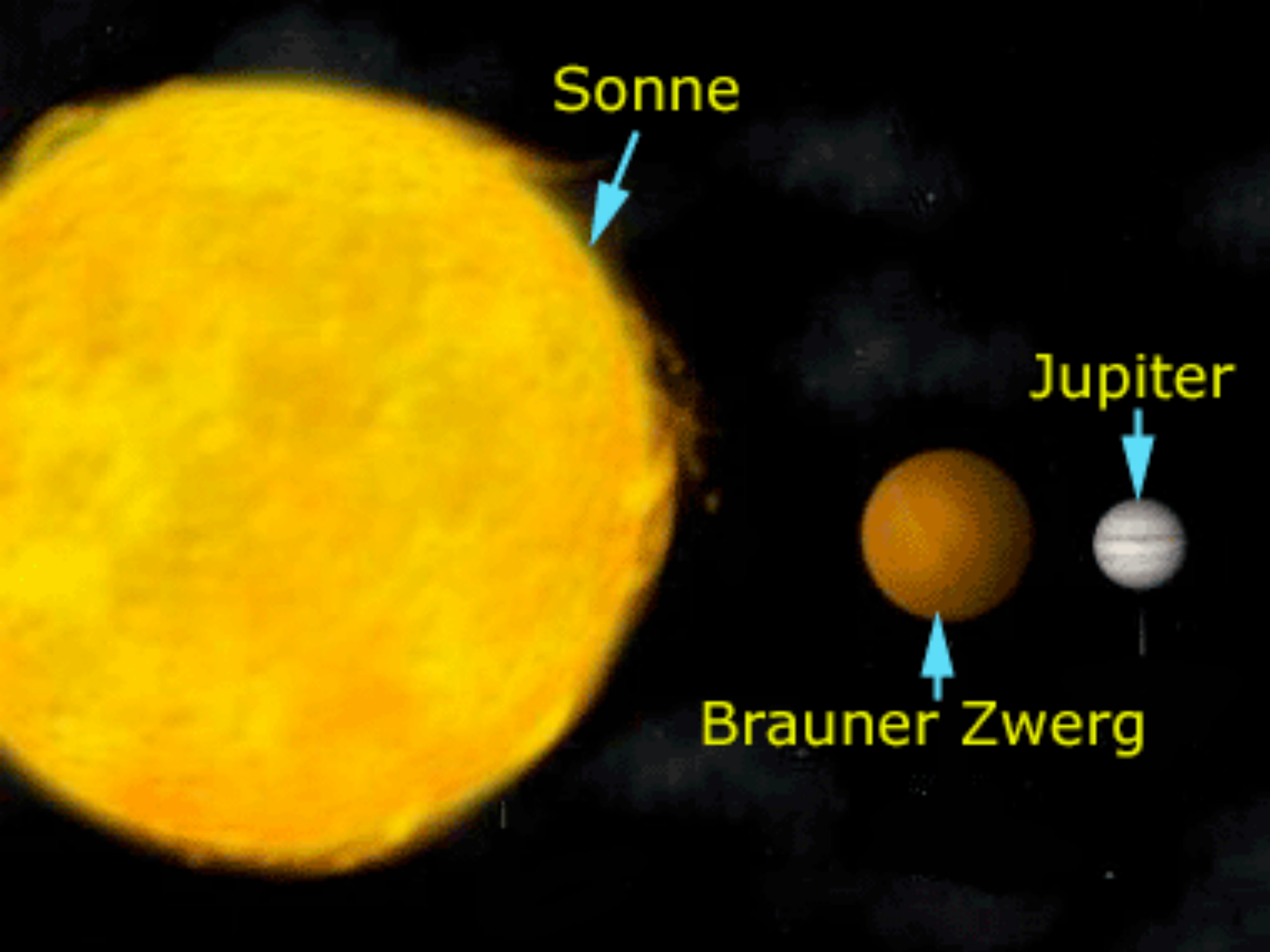
Jupiter

Saturn

Uranus

Neptun

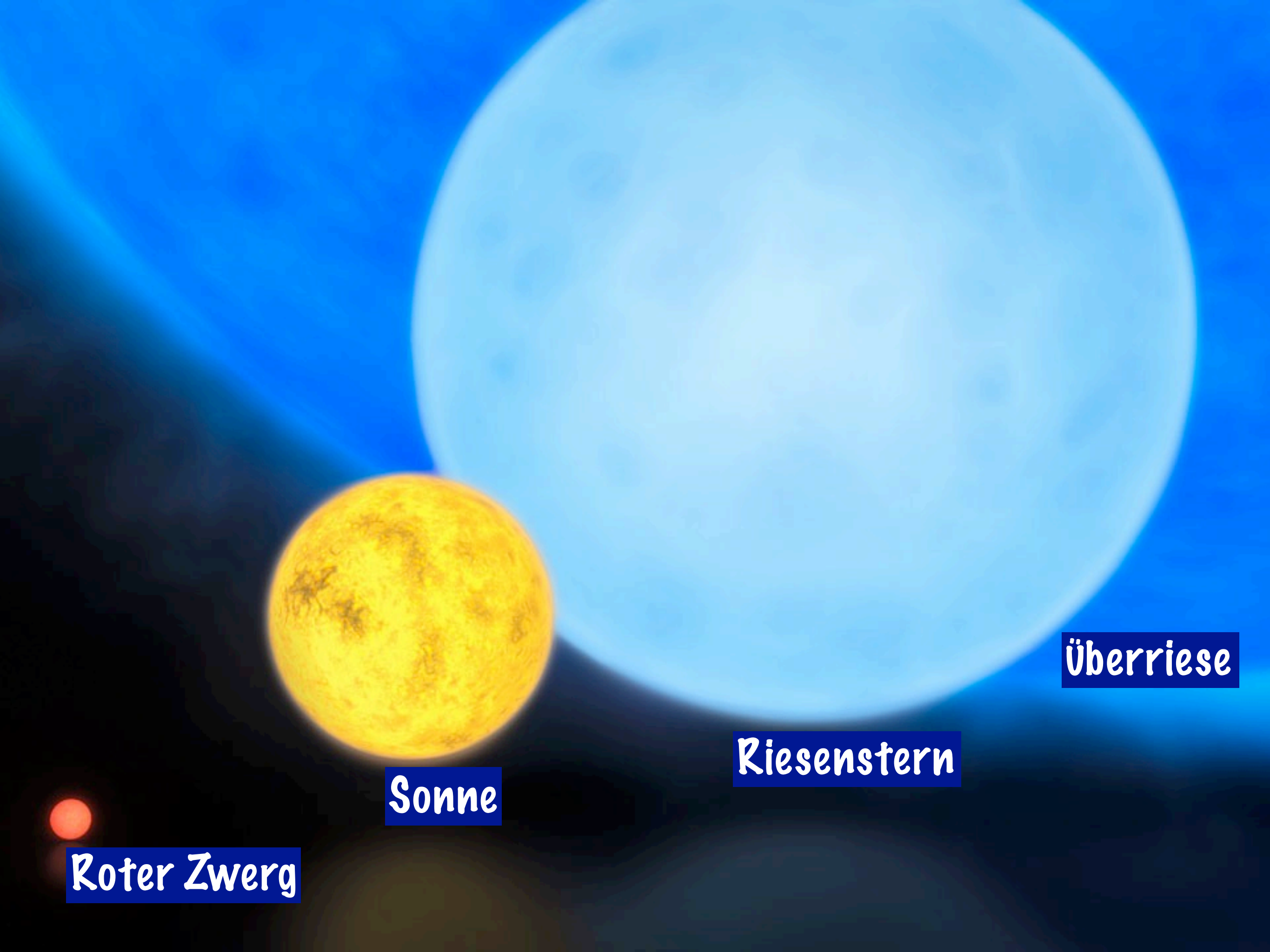
Ceres



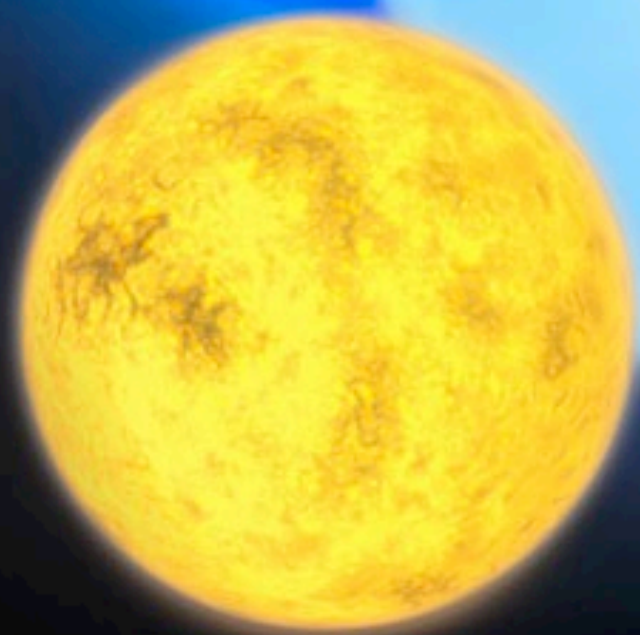
Sonne

Jupiter

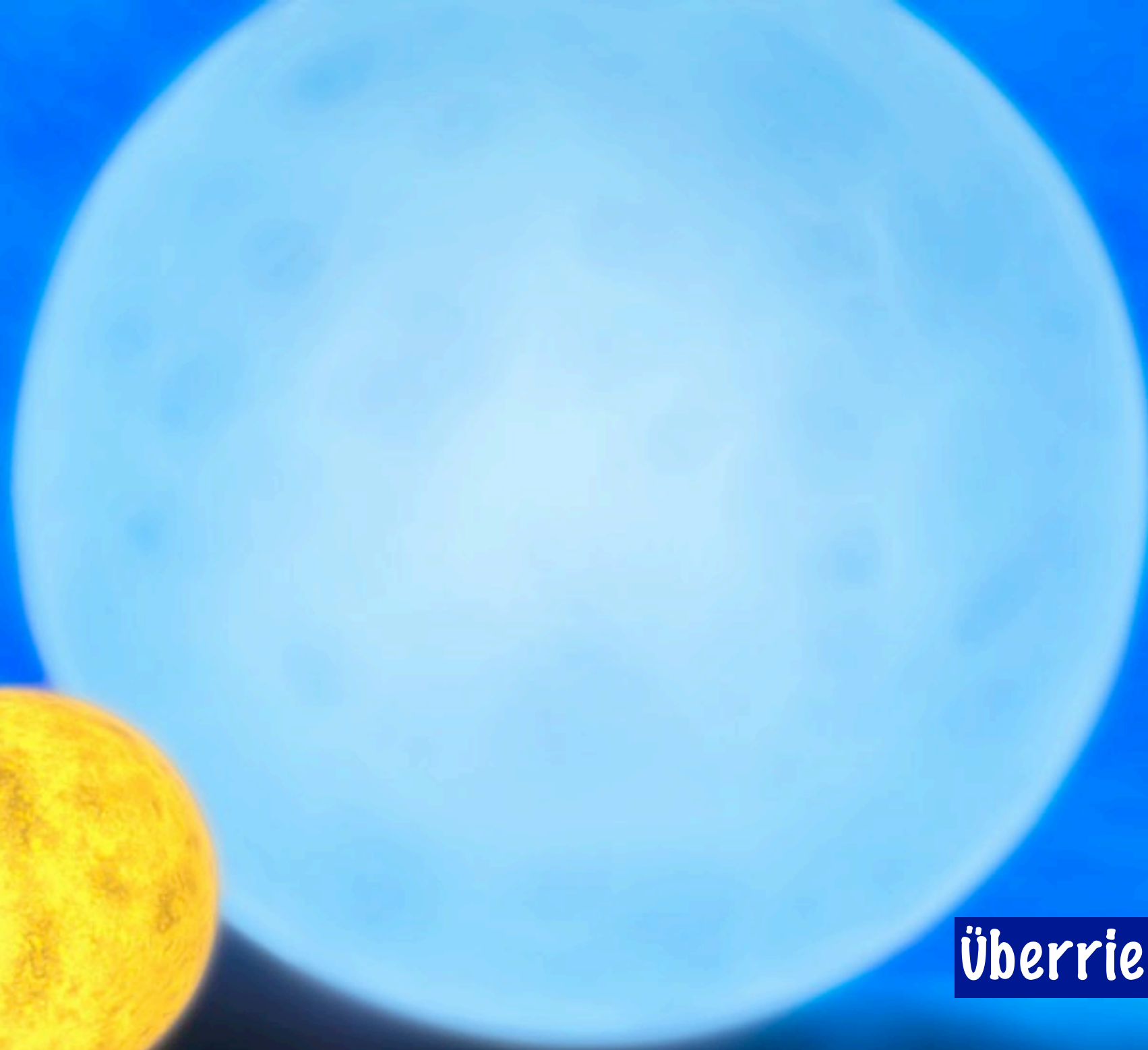
Brauner Zwerg



Roter Zwerg



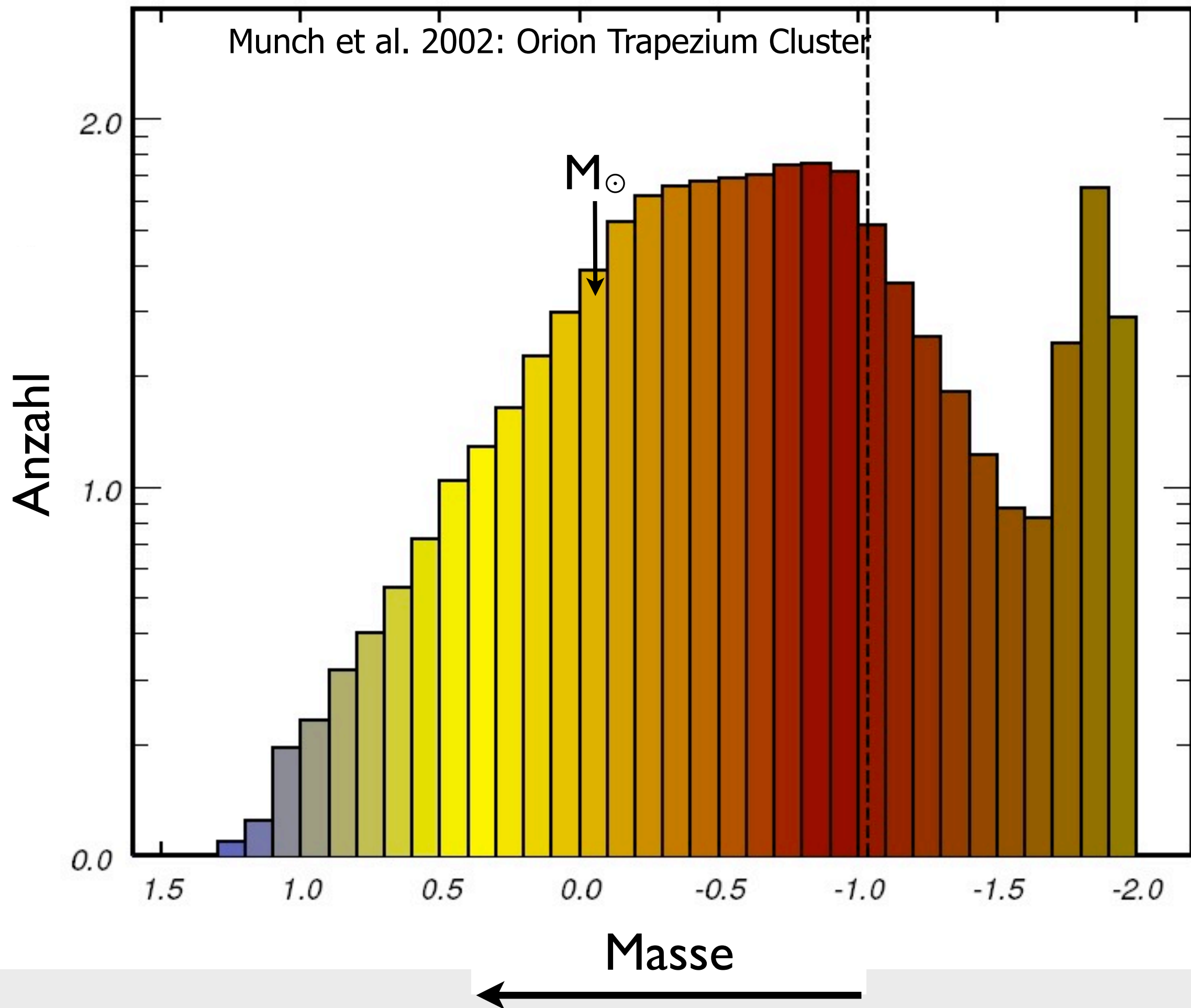
Sonne



Riesenstern

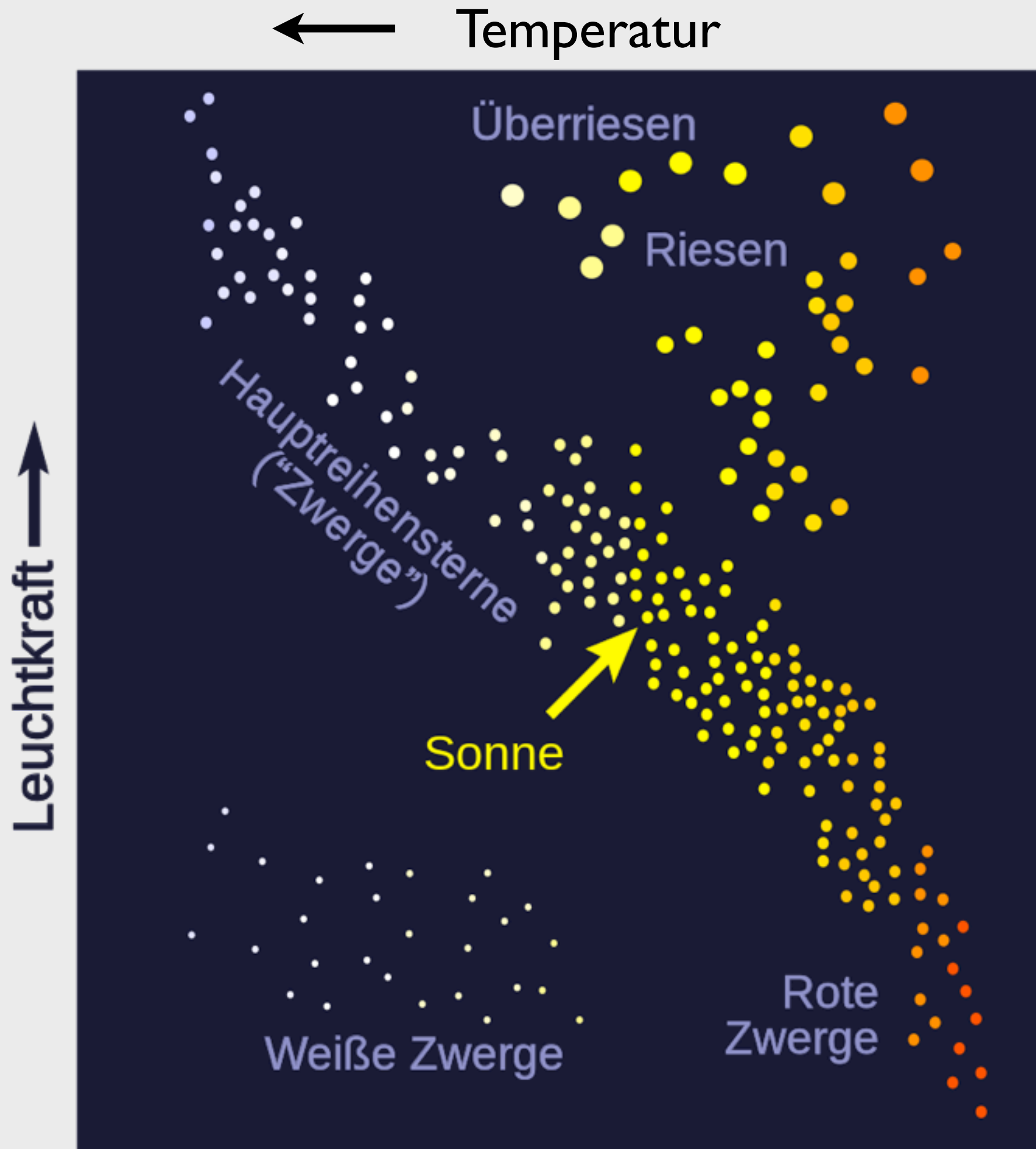
Überriese

Munch et al. 2002: Orion Trapezium Cluster

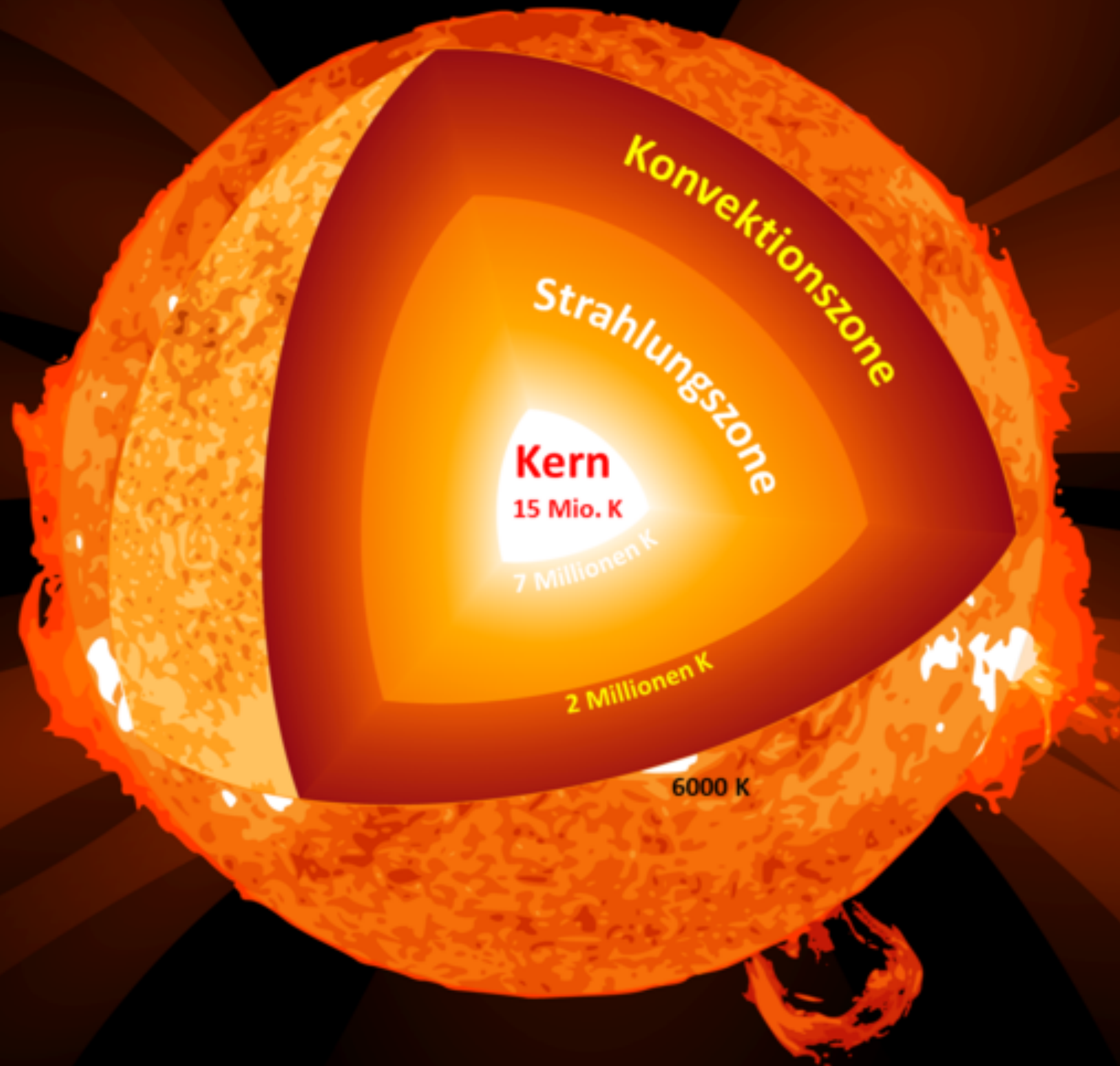




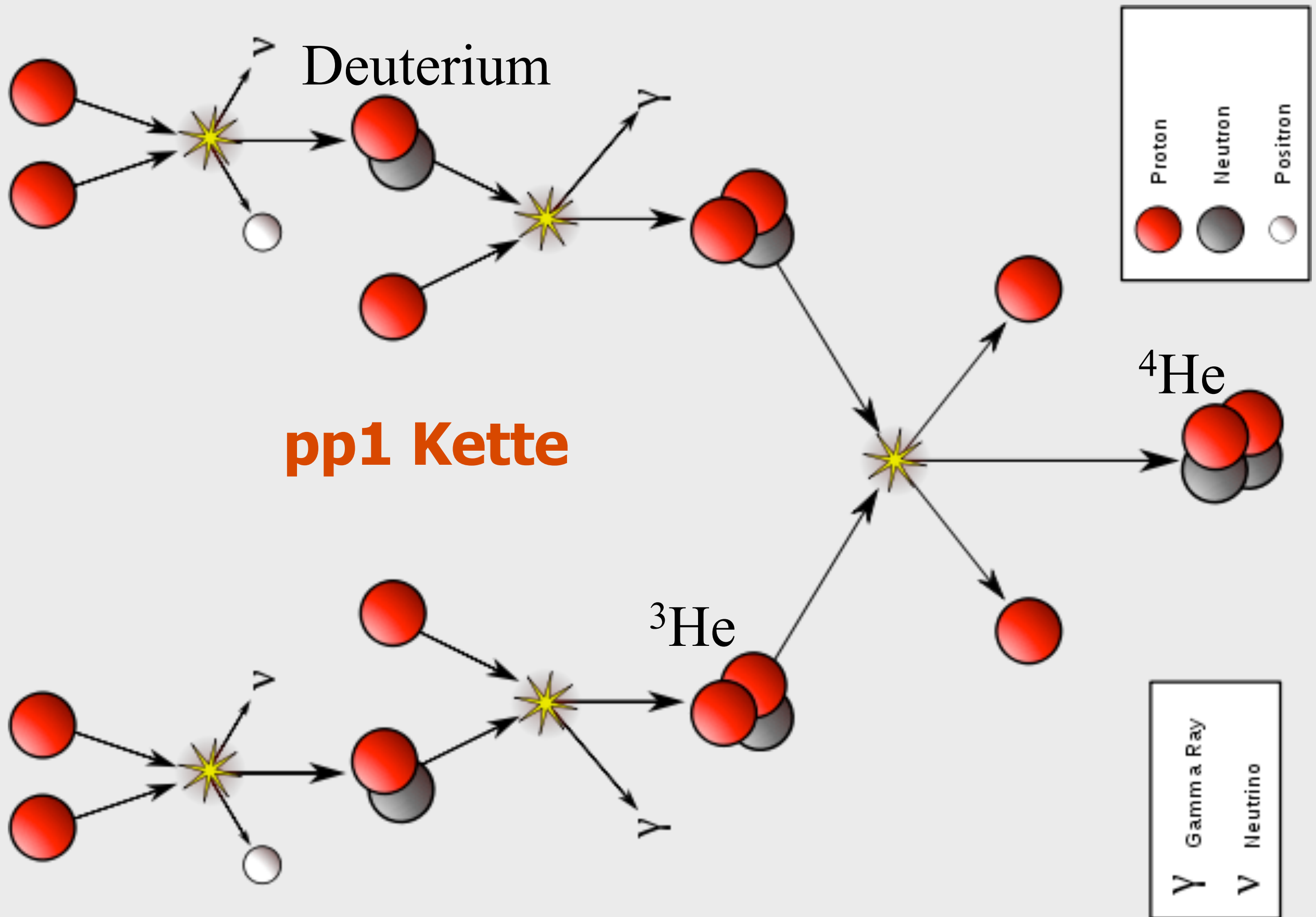
Plejaden, M 45

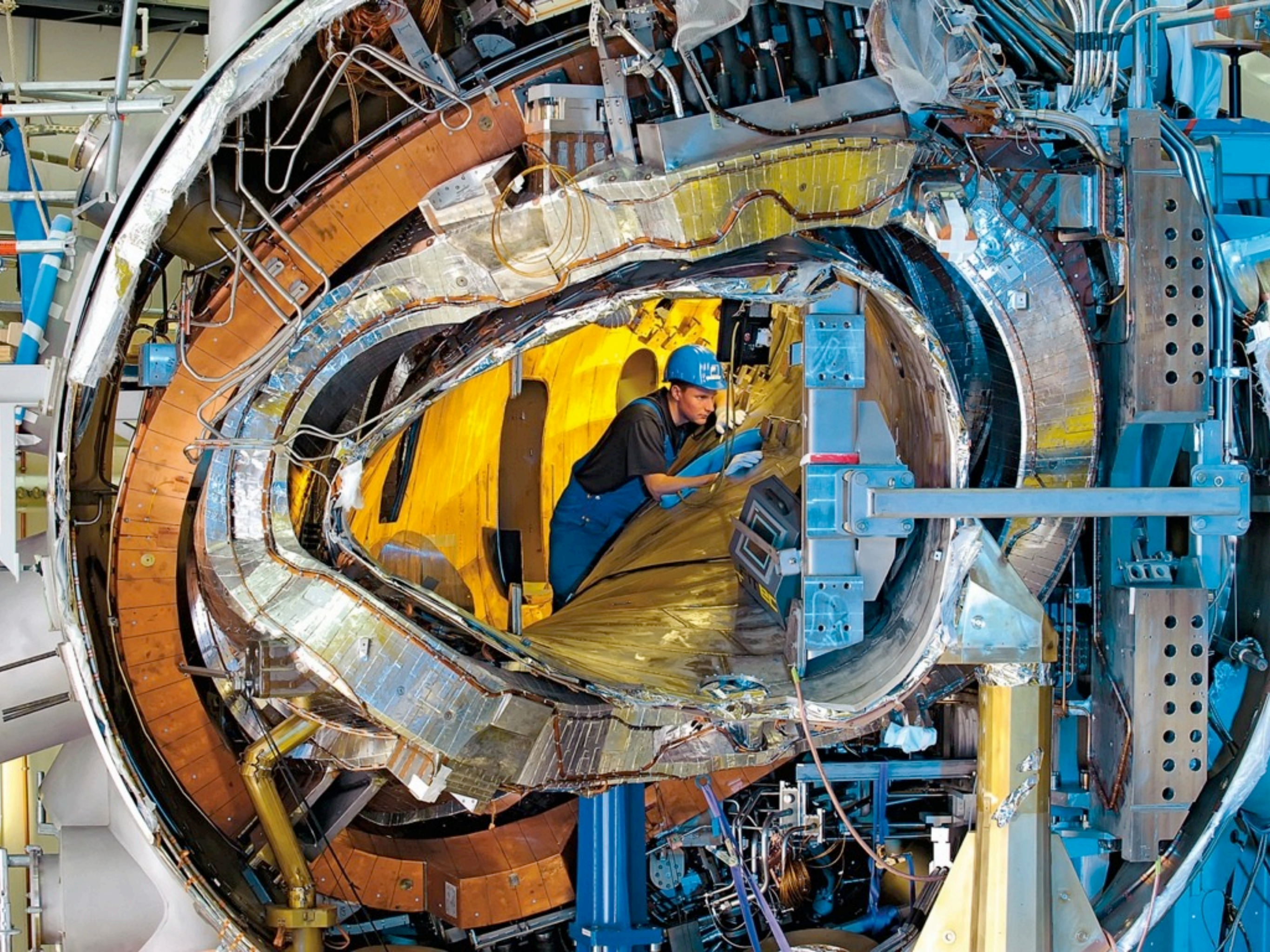


Hertzsprung-
Russell-
Diagramm
(HRD)

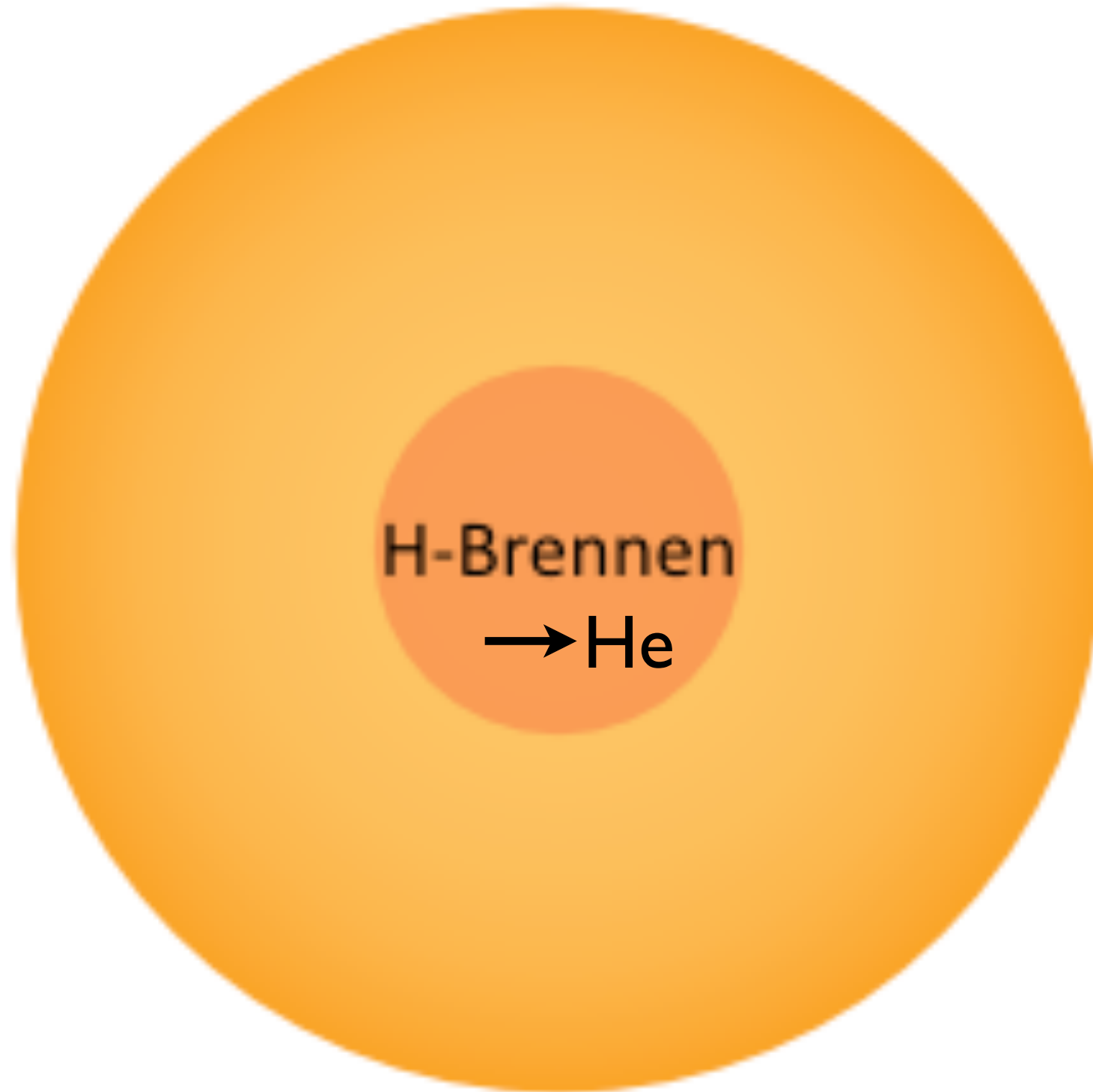


Wasserstoff-Brennen

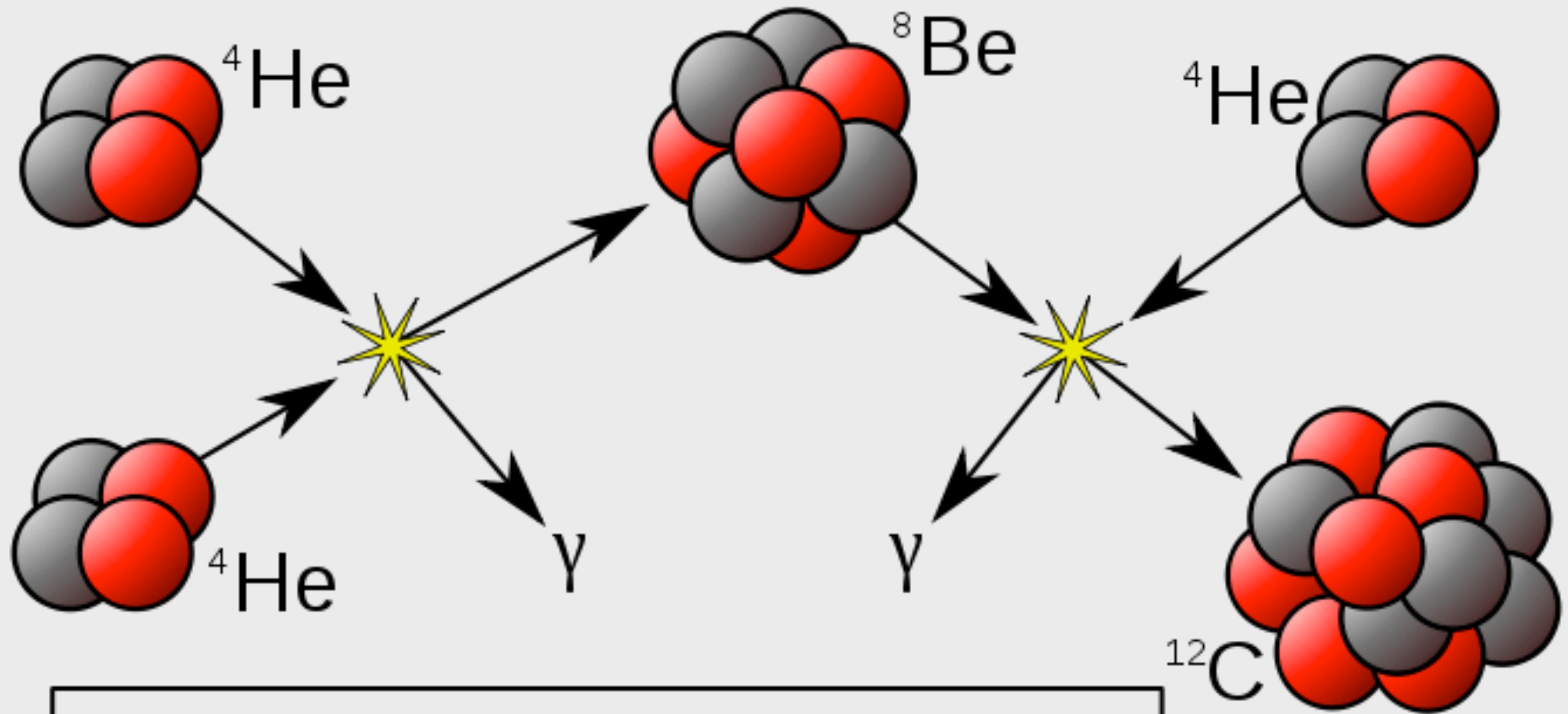




Wasserstoff-Brennen



Helium-Brennen



Proton

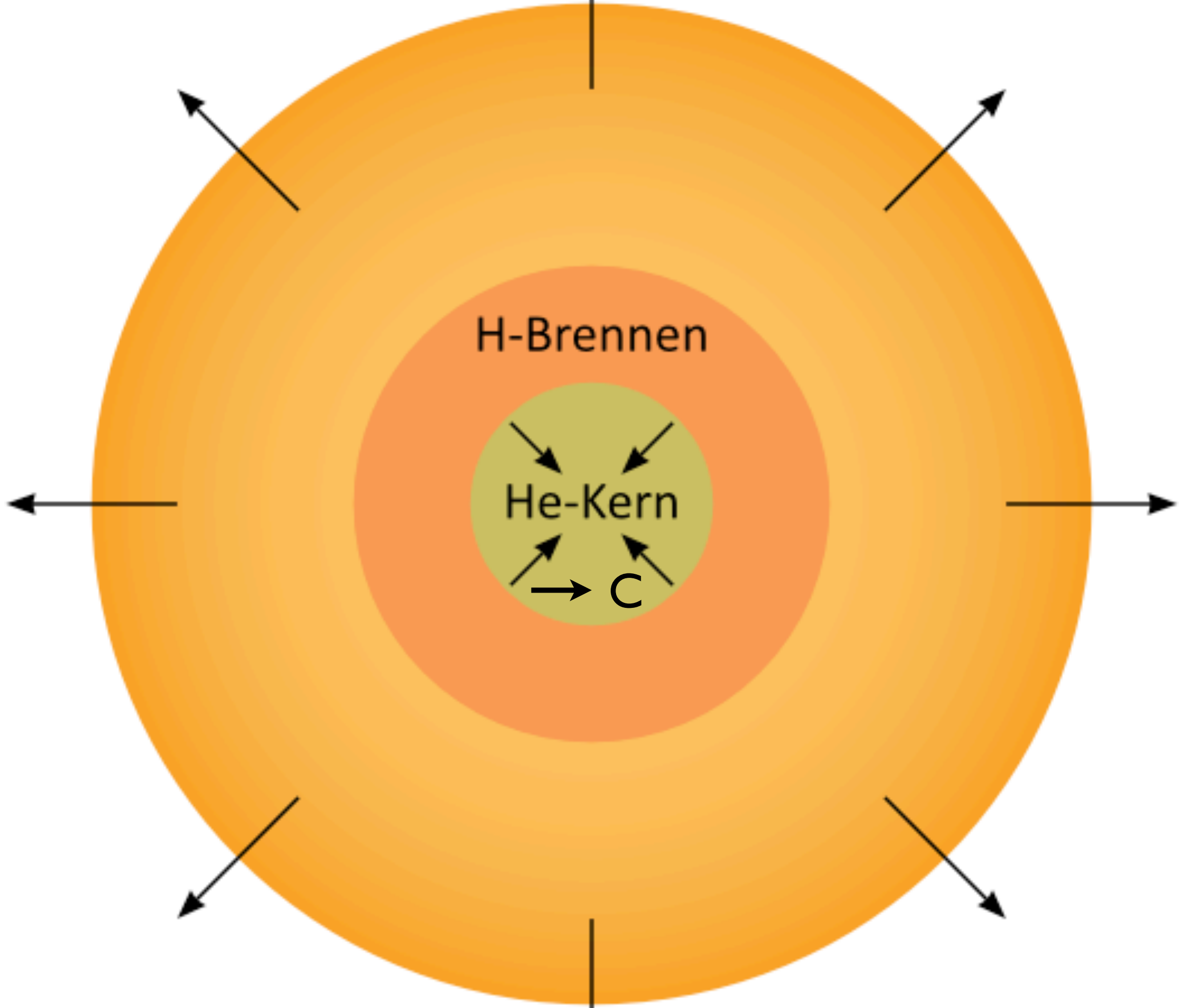


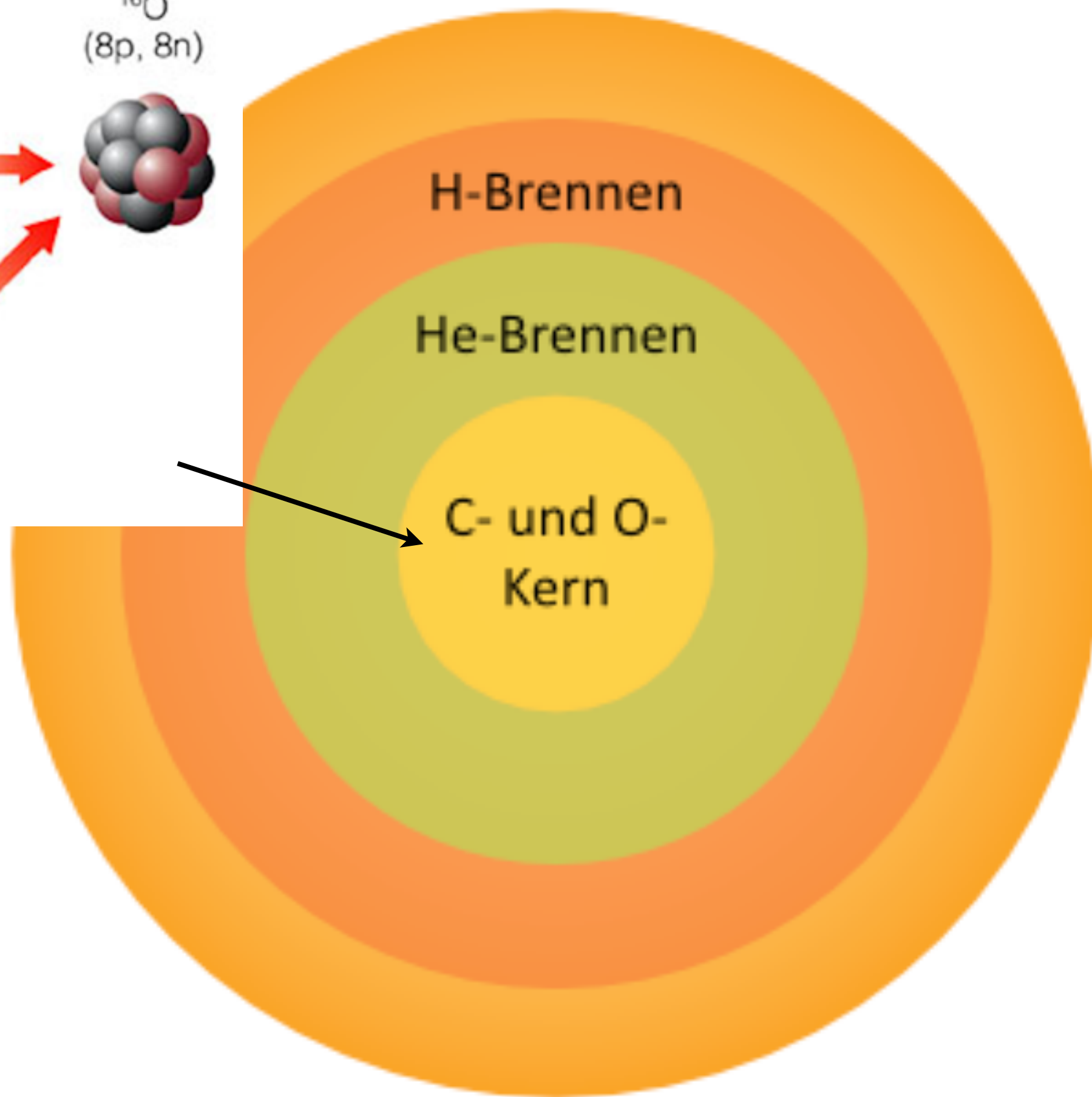
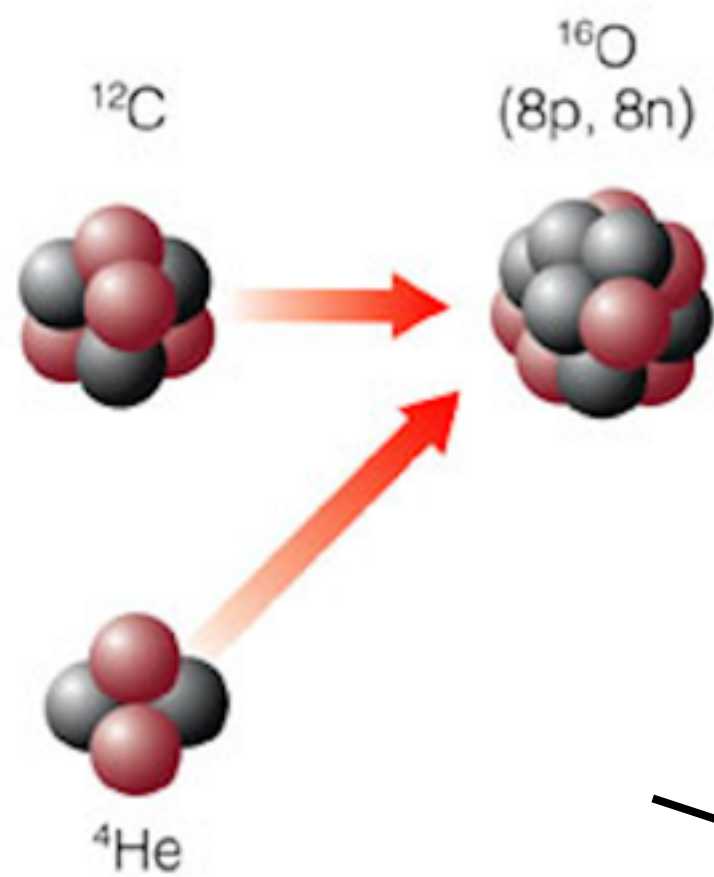
Neutron



Gamma Ray







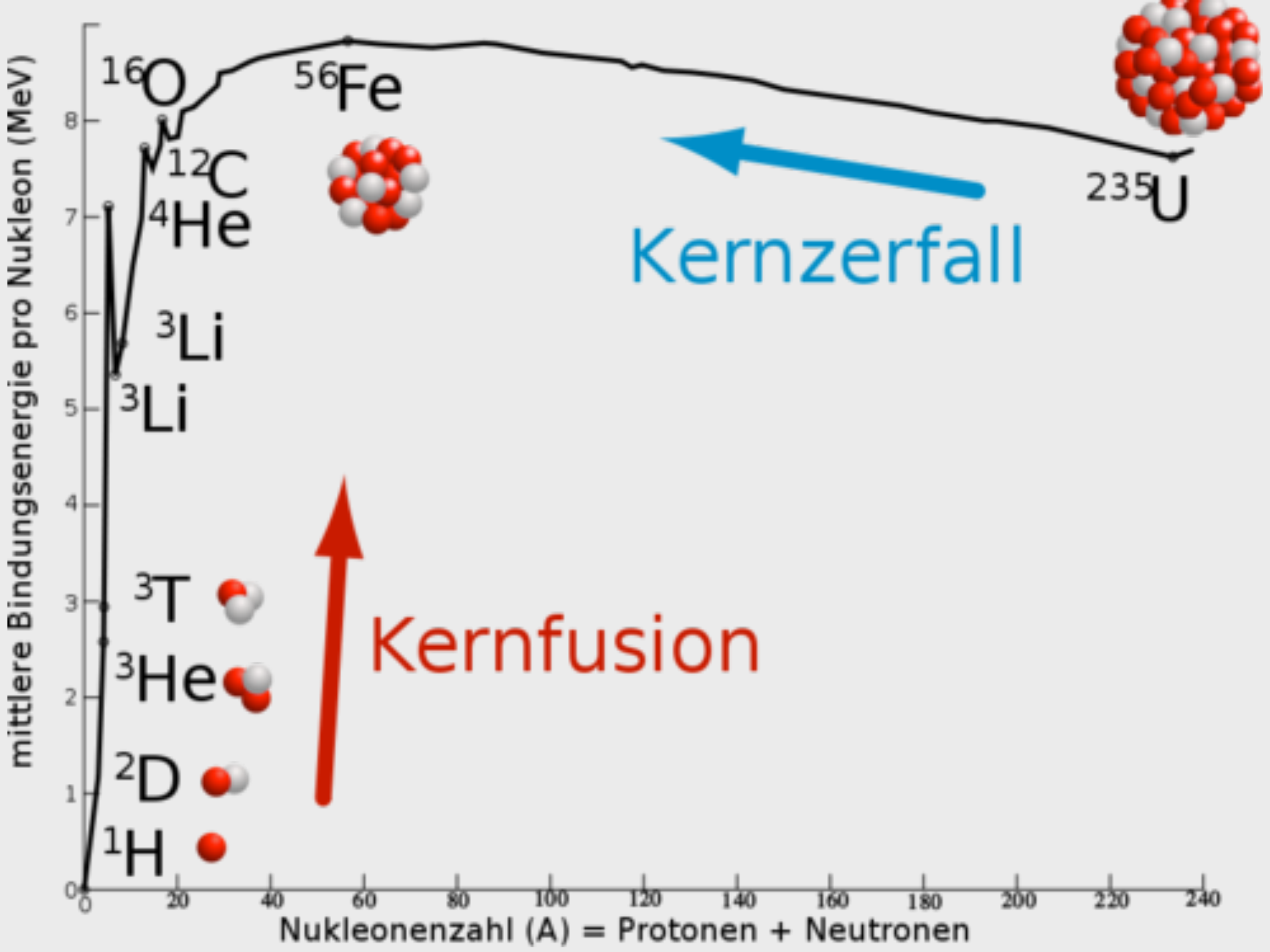
Der Mensch
besteht bis zu



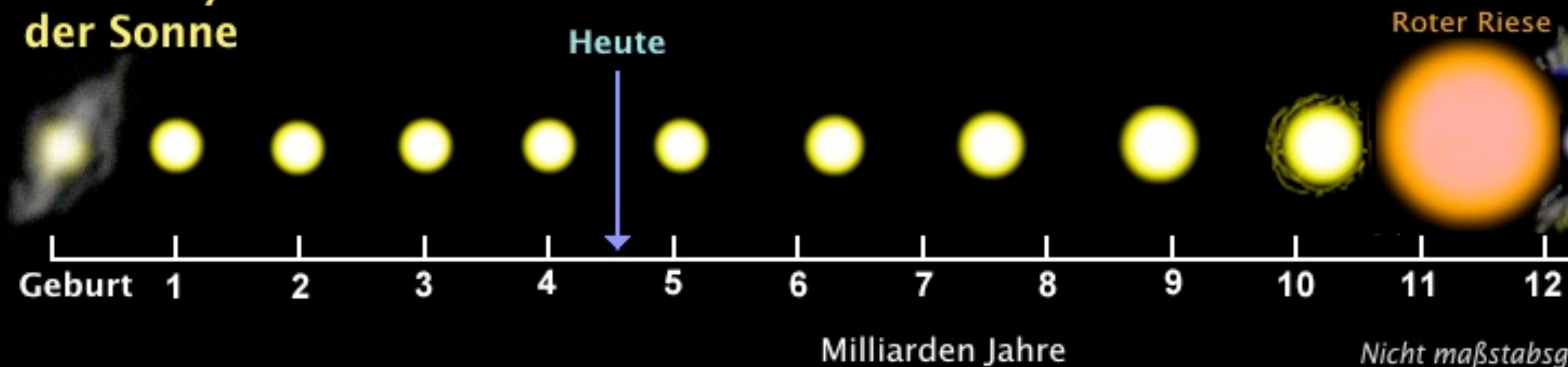
70%

aus Wasser

= H₂O



Lebenszyklus der Sonne



Heute



Sun



Mercury
0.38 AU



Venus
0.72 AU



Earth
1 AU



Mars
1.52 AU

Heute



Sun



Mercury
0.38 AU



Venus
0.72 AU



Earth
1 AU



Mars
1.52 AU

in ca.
7 Milliarden Jahren

Sun as red giant
0.9 solar mass



Earth
1.1 AU



Mars
1.69 AU

Heute



Sun



Mercury
0.38 AU



Venus
0.72 AU



Earth
1 AU



Mars
1.52 AU

in ca.
7 Milliarden Jahren

Sun as red giant
0.9 solar mass



Earth
1.1 AU



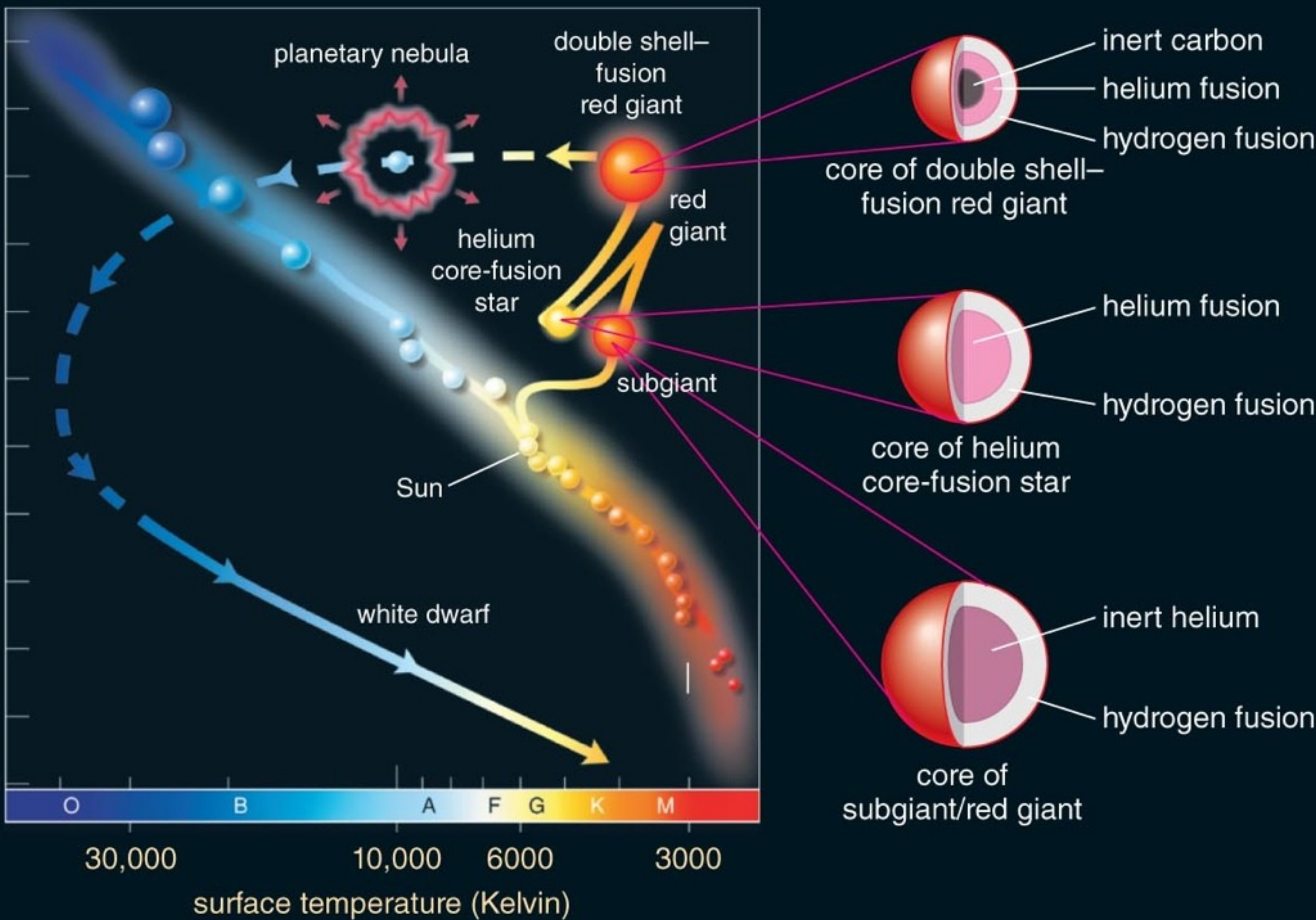
Mars
1.69 AU

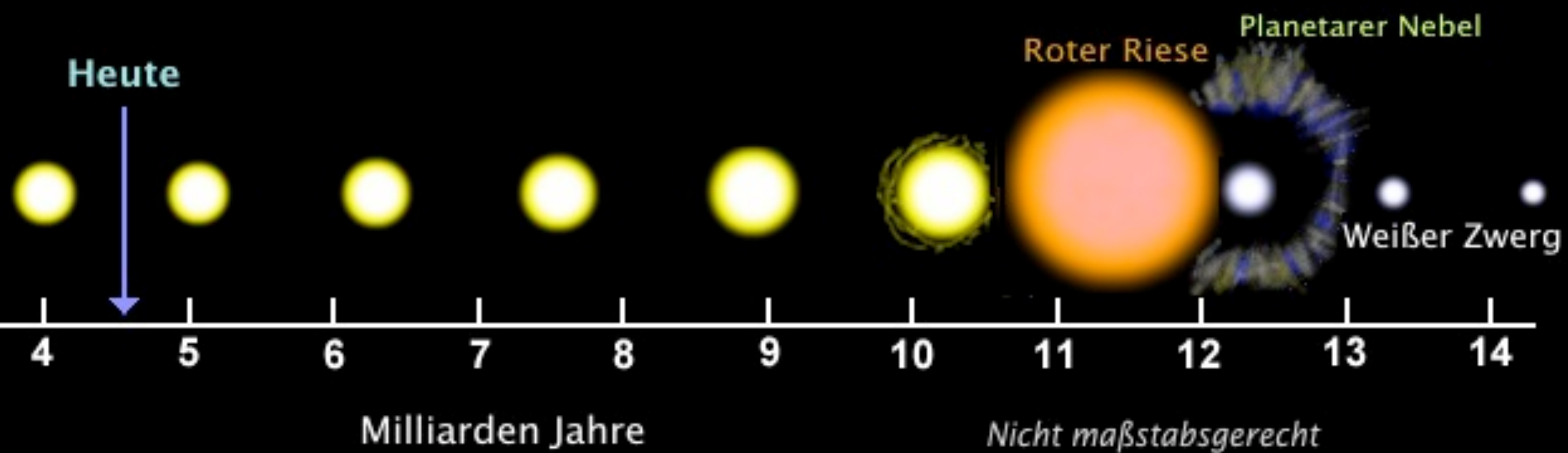
ca. 10 Millionen Jahre
später

Sun as red giant
0.8 solar mass



Mars
1.9 AU





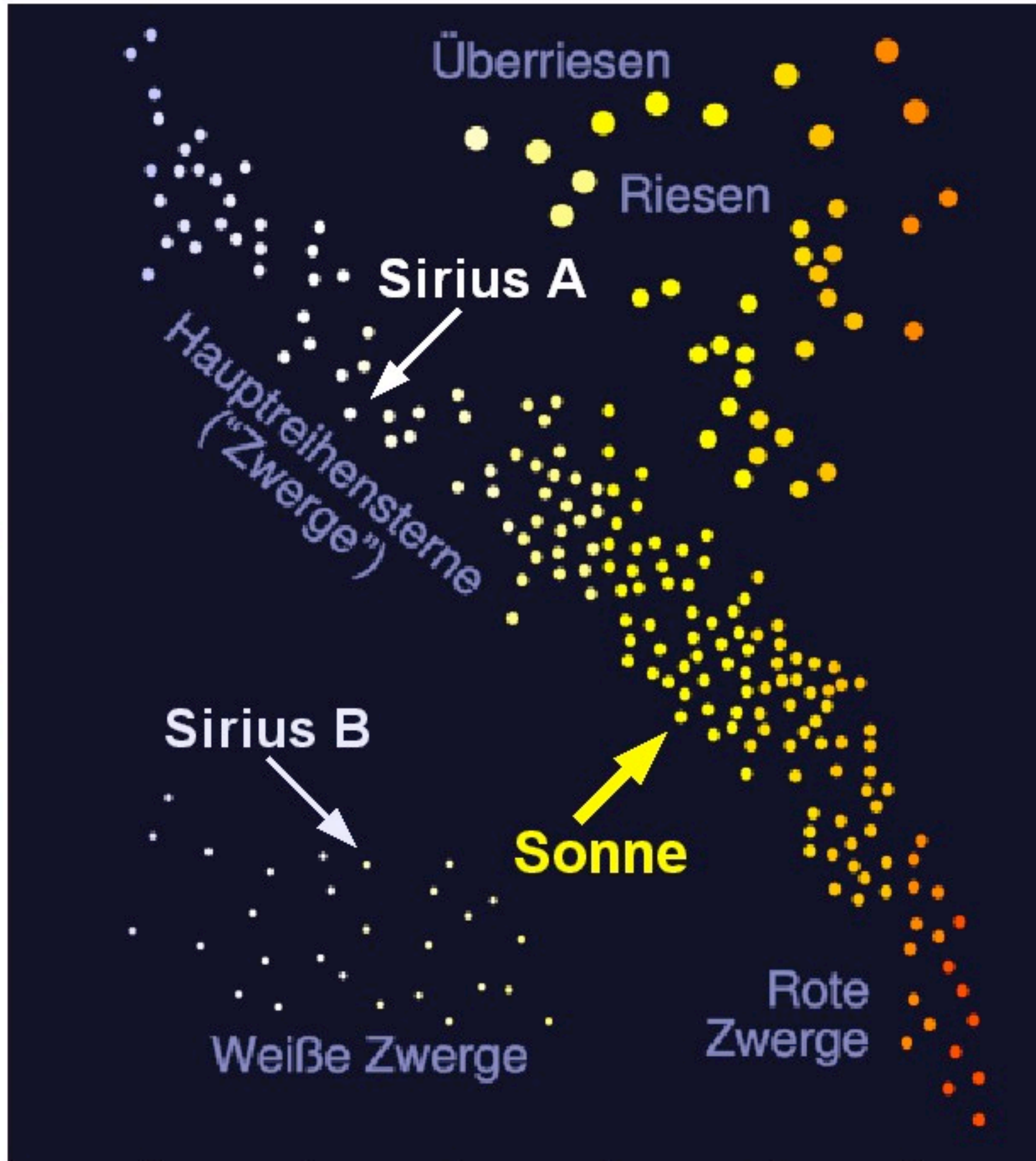




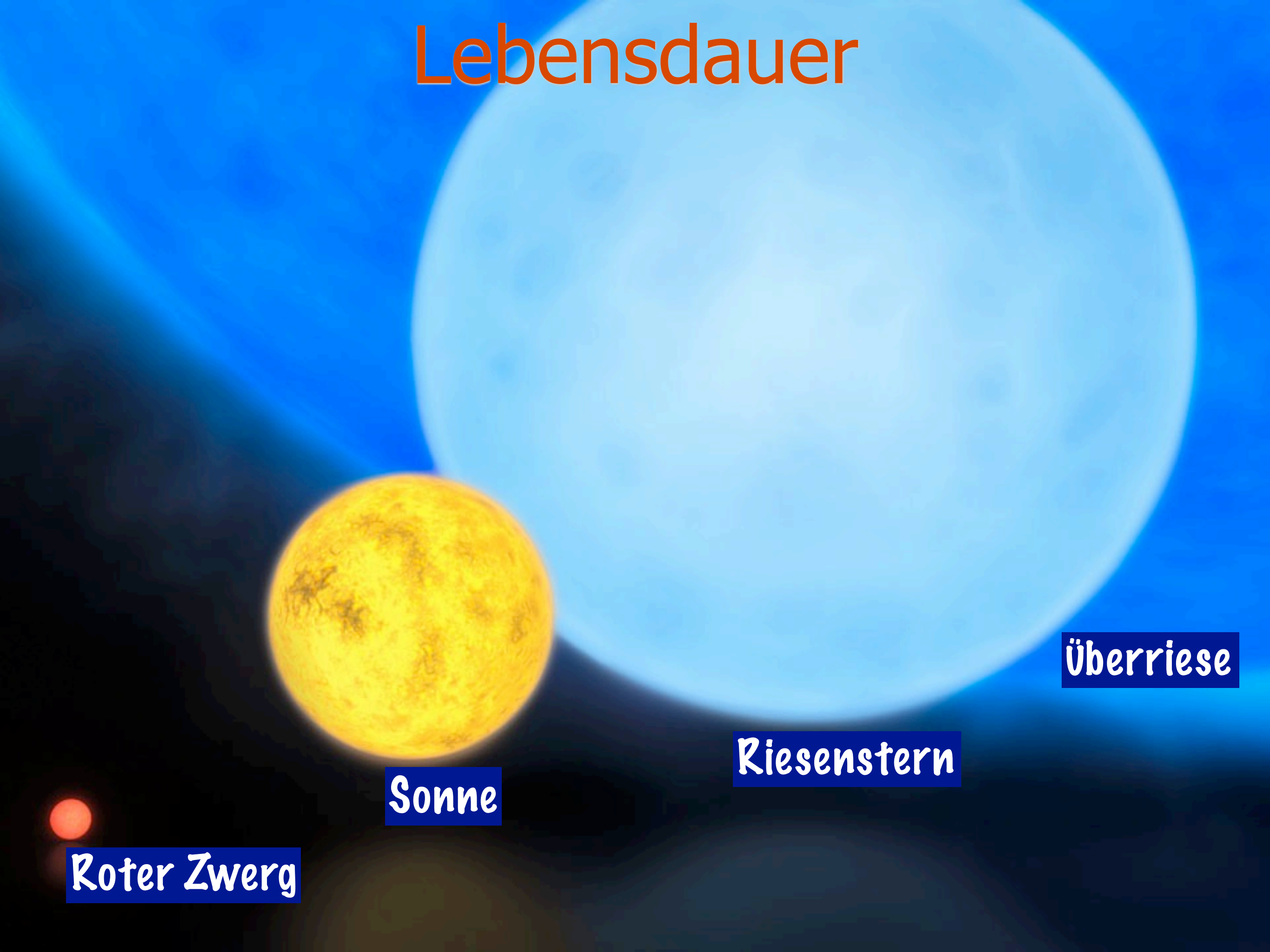


← Temperatur

Leuchtkraft ↑



Lebensdauer



Sonne

Roter Zwerg

Riesenstern

Überriese

Lebensdauer

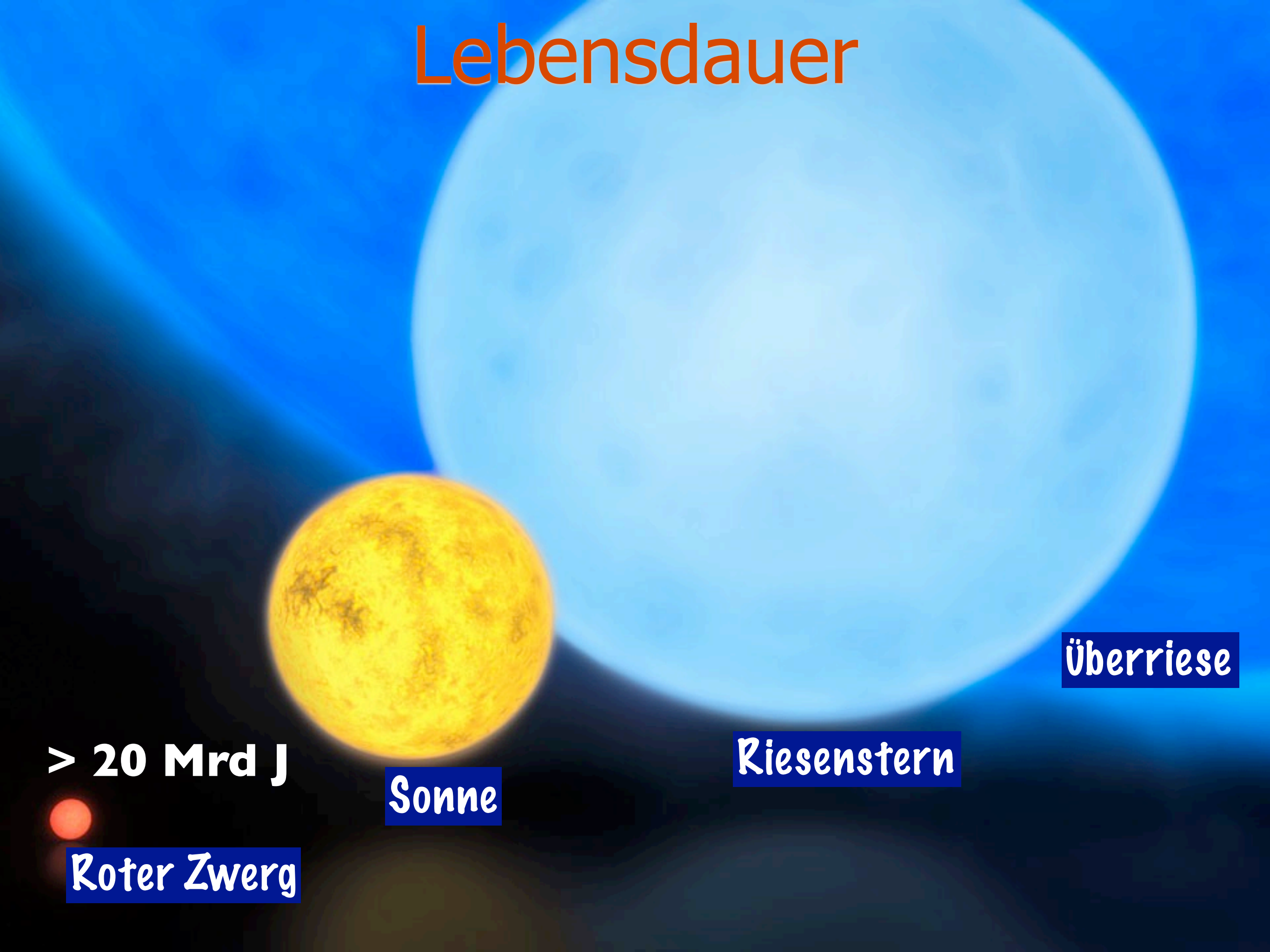
> 20 Mrd J

Sonne

Riesenstern

Überriese

Roter Zwerg



Lebensdauer

> 20 Mrd J



Roter Zwerg



Sonne

10 Mrd J

Riesenstern

Überriese



Lebensdauer

> 20 Mrd J



Roter Zwerg



Sonne

10 Mrd J

Riesenstern

10 Mio J



Überriese

Lebensdauer

> 20 Mrd J



Roter Zwerg



Sonne

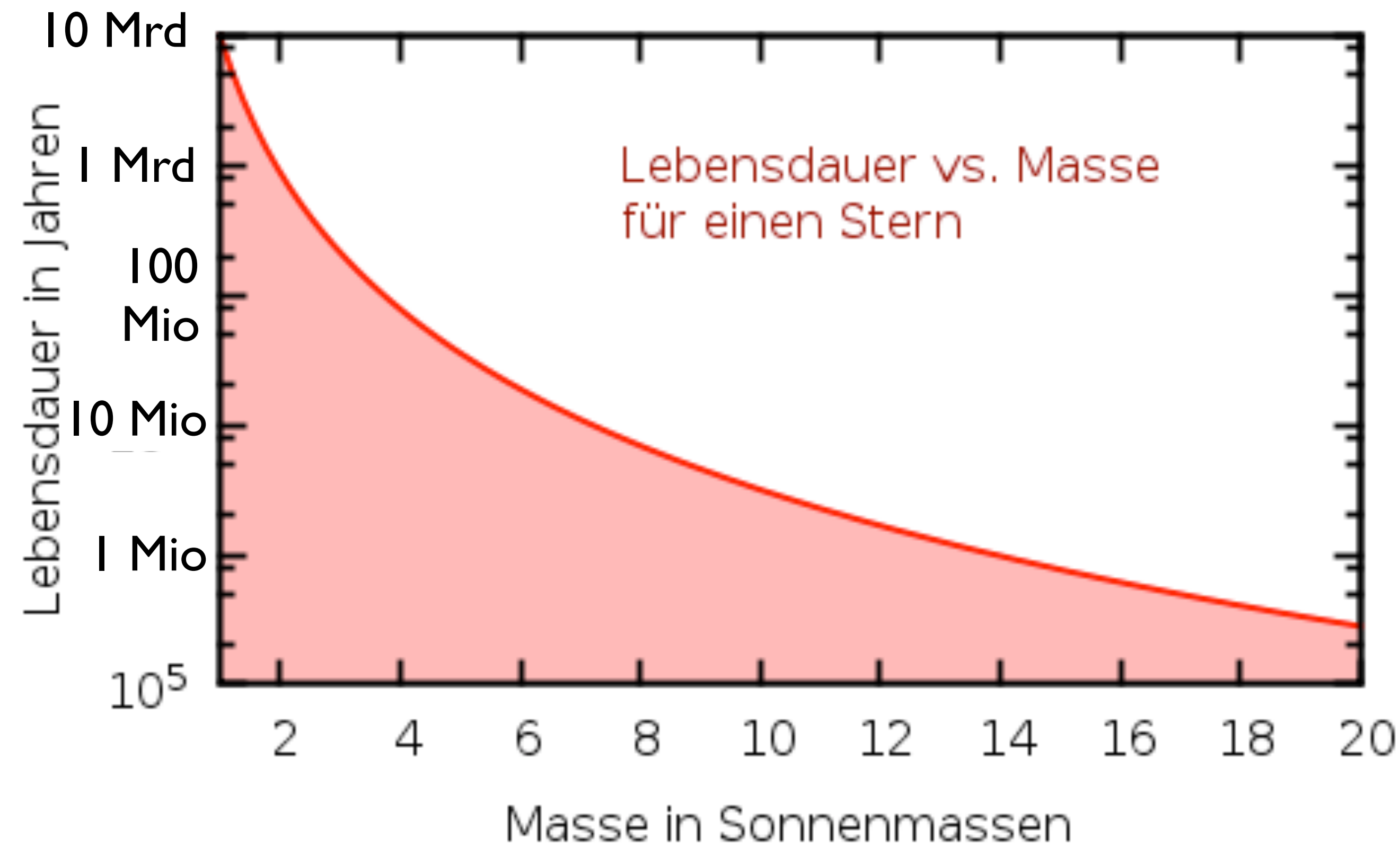
10 Mrd J

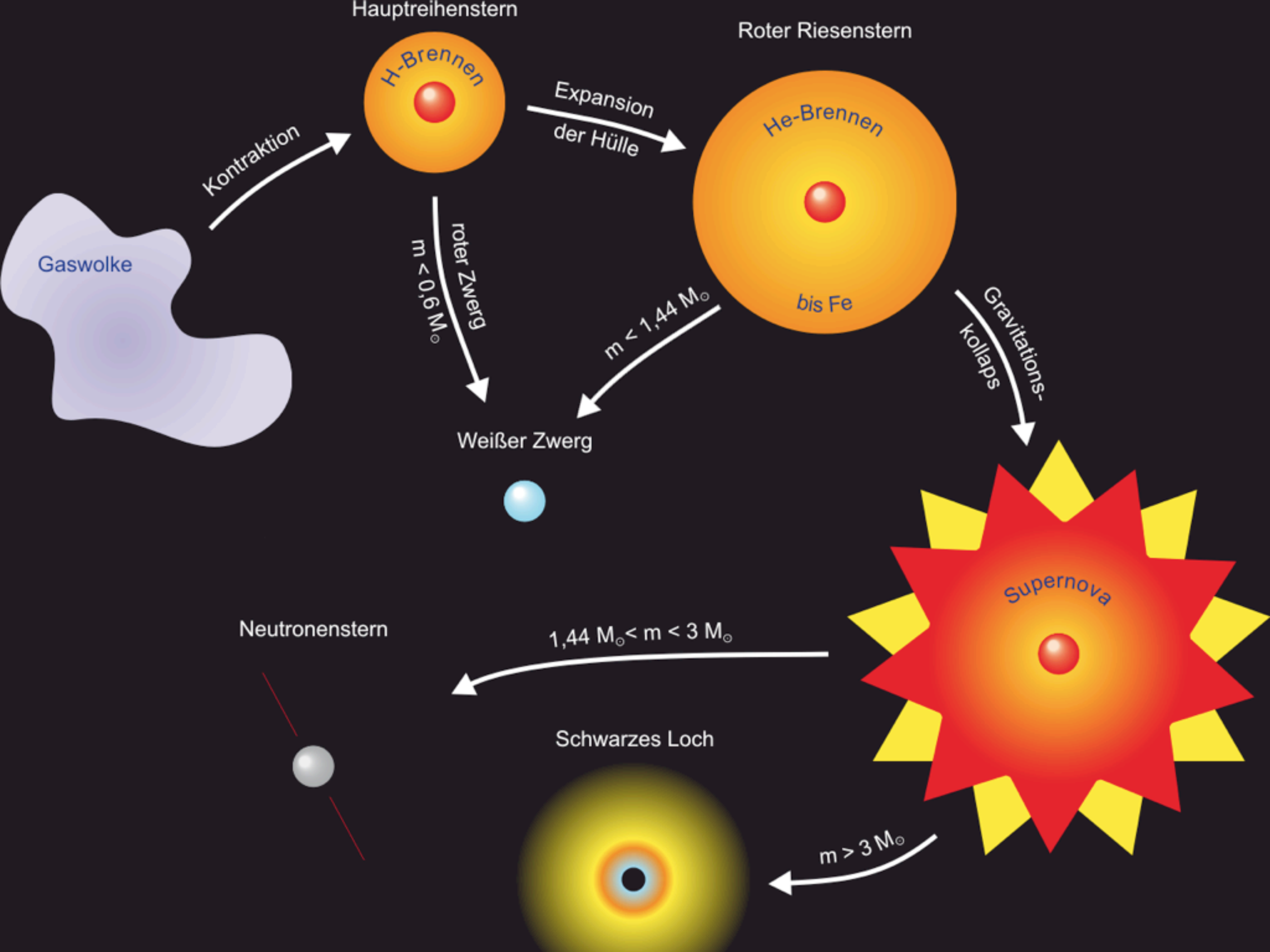
Riesenstern

10 Mio J

Überriese

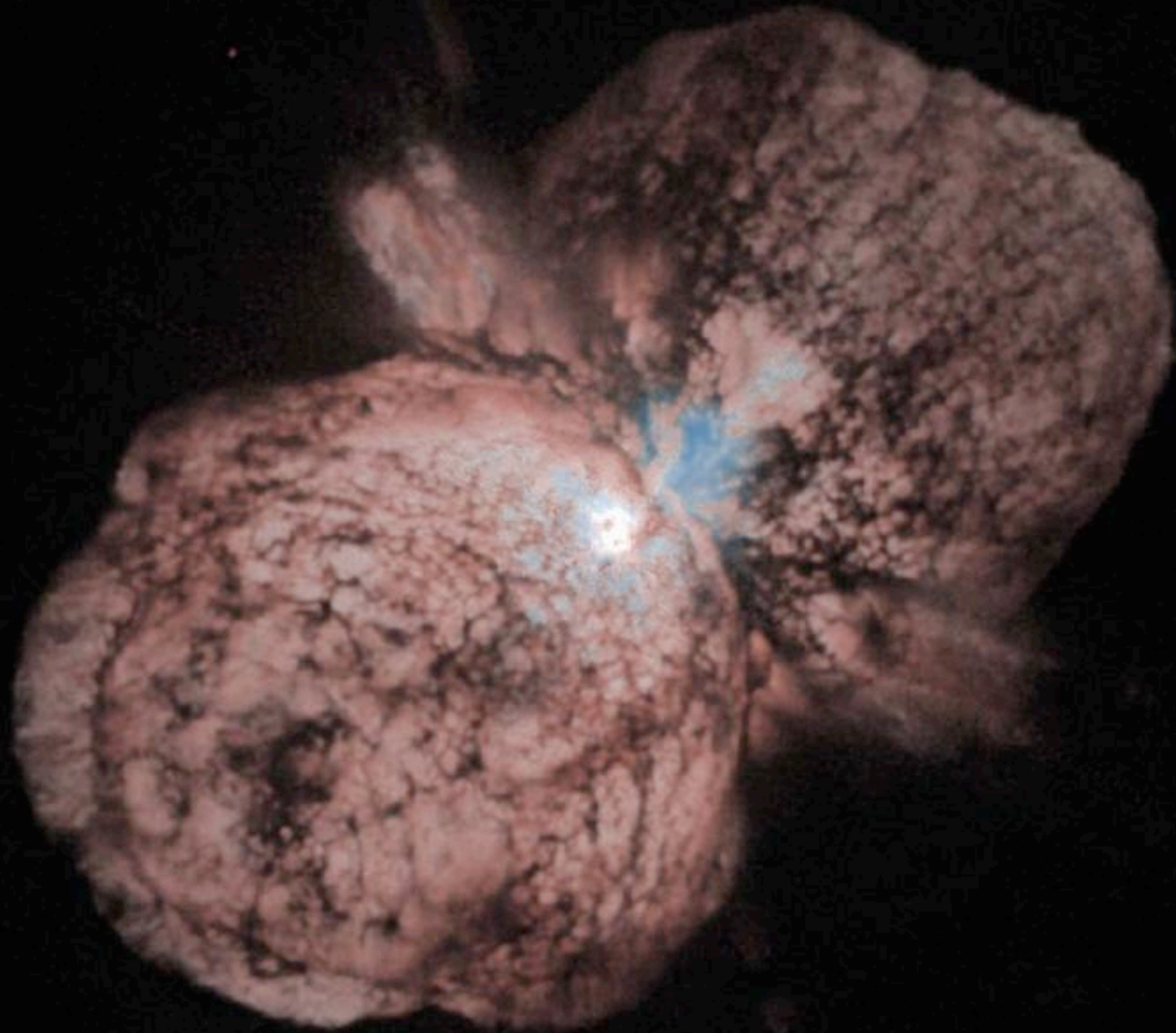
< 1 Mio J





Massereiche Sterne









Ende eines massereichen Sterns

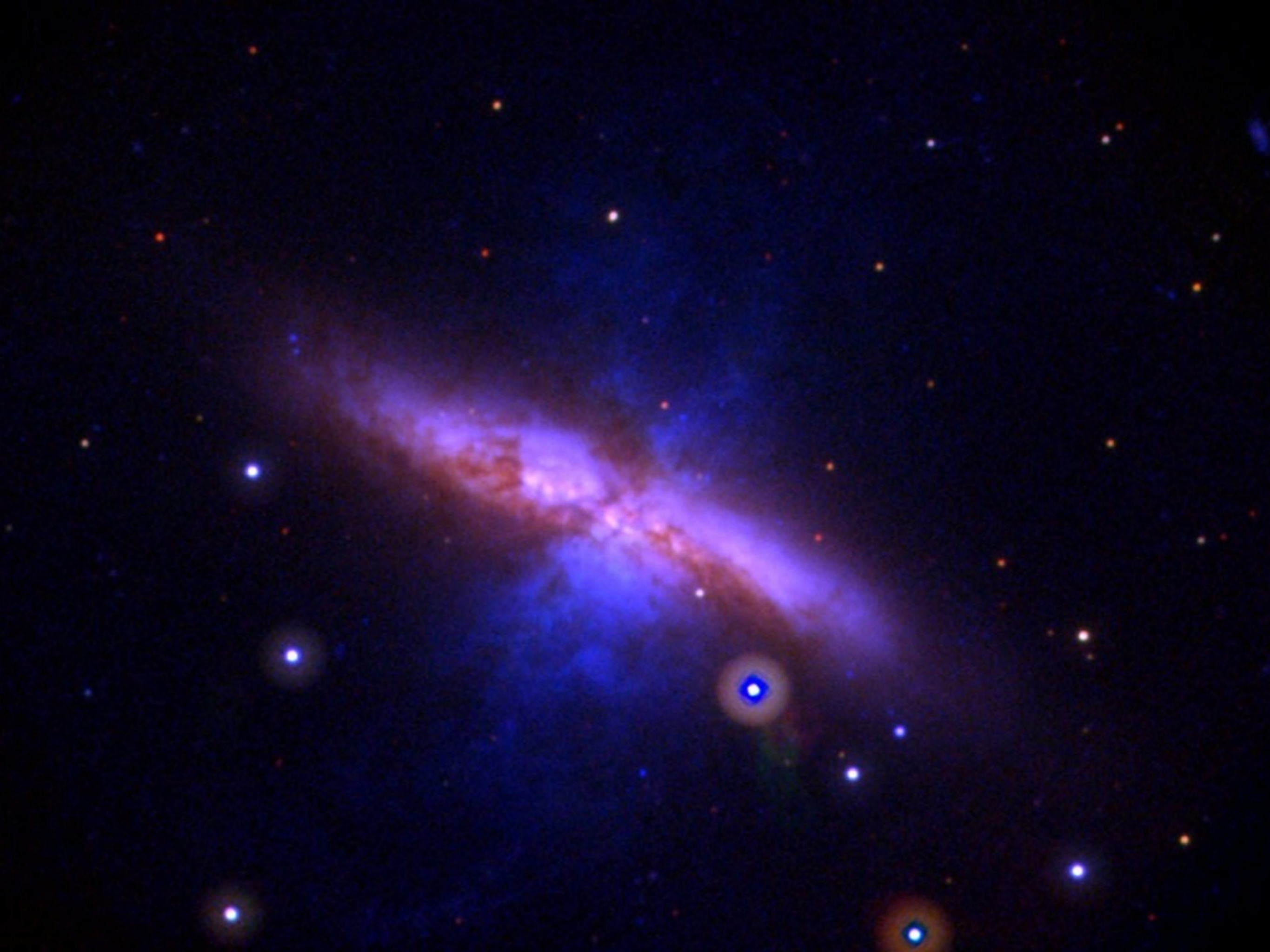


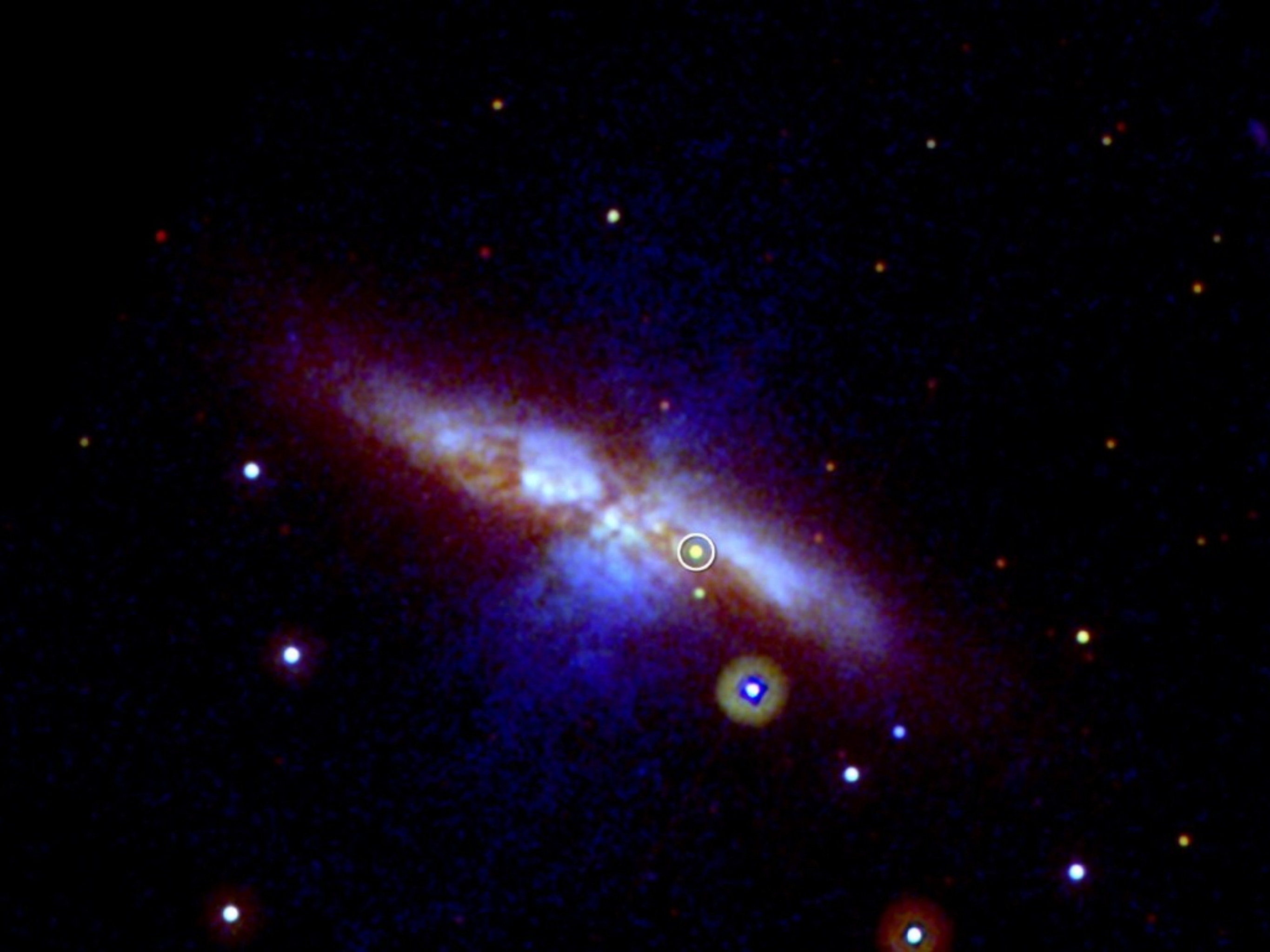


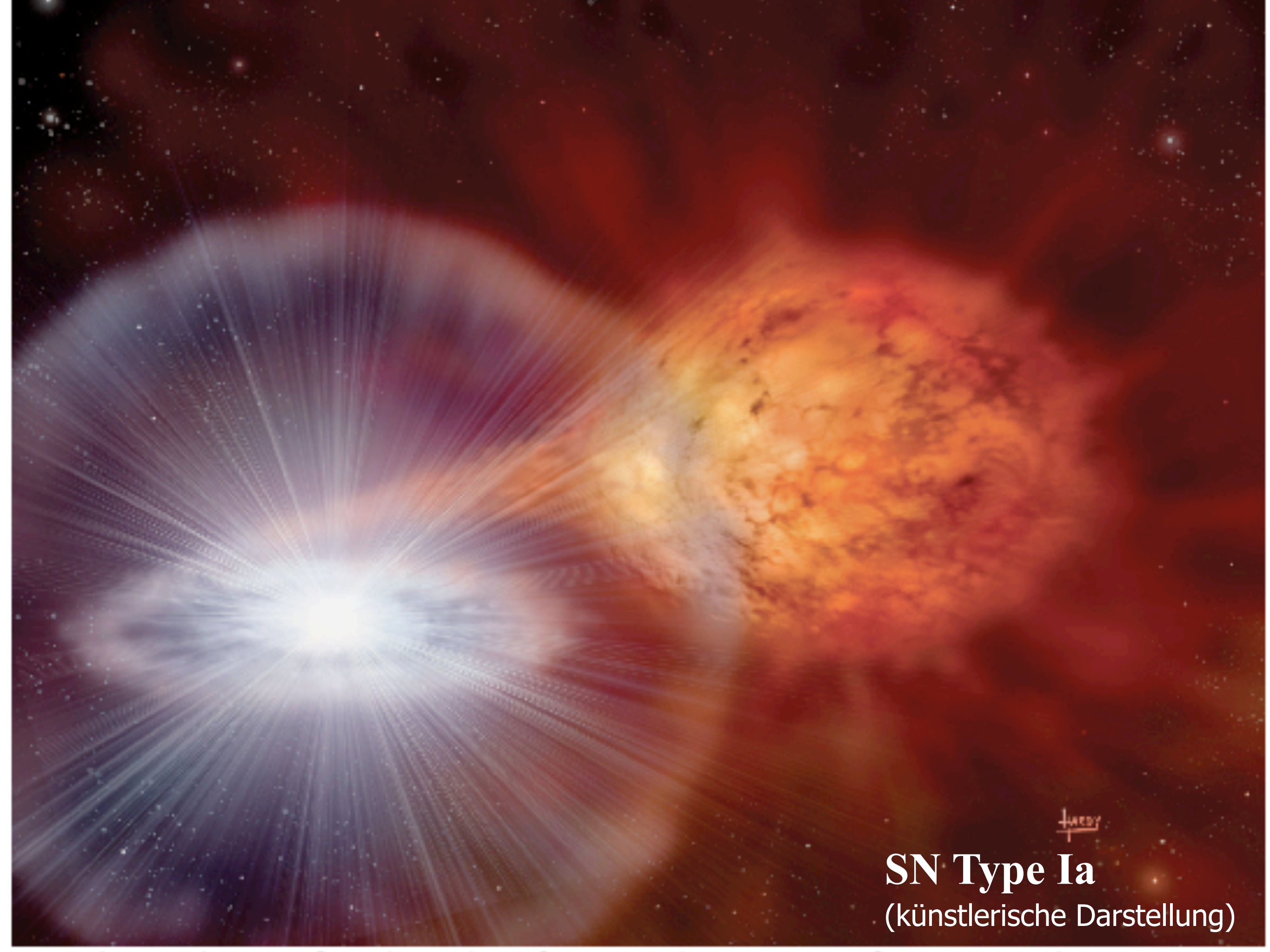
SN 2011fe



SN 2011fe

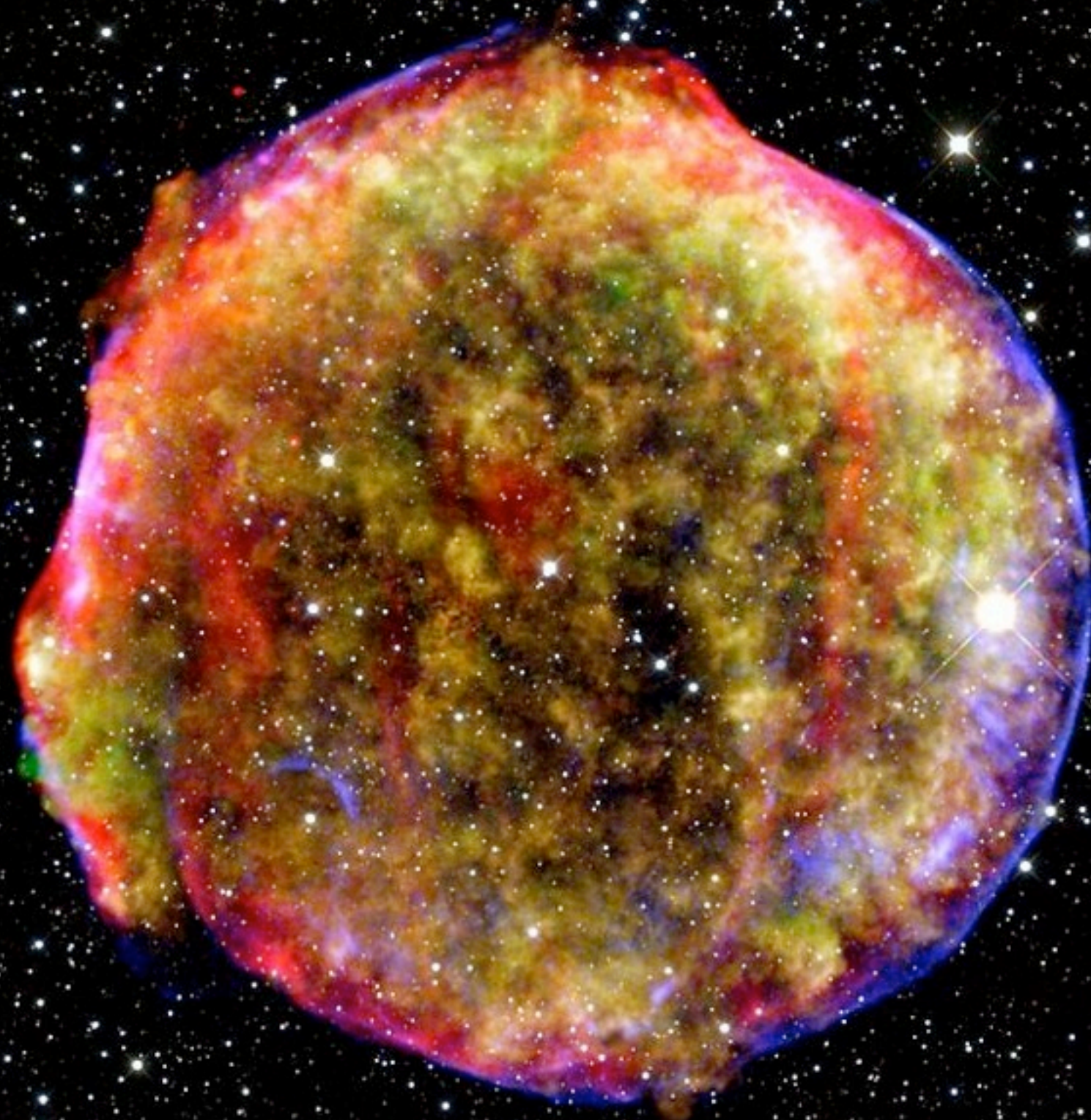






twinkl

SN Type Ia
(künstlerische Darstellung)



SN 1572: Tycho's Supernova Überrest (SNR)
im Sternbild Kassiopeia



Endstadien der Sternentwicklung (nicht maßstabsgetreu)

Stern kleiner 0.3
Sonnenmassen



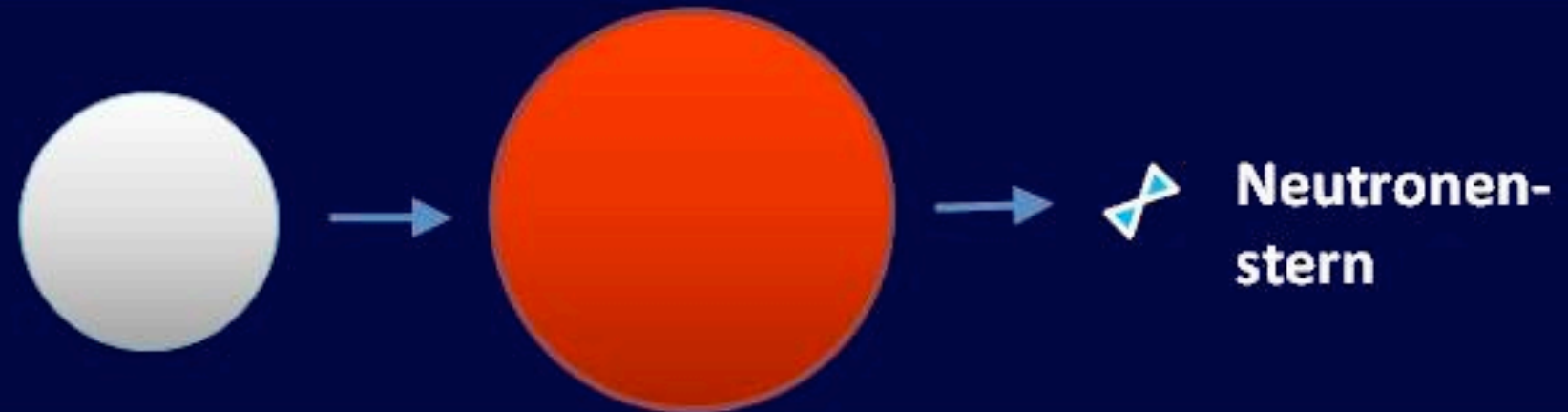
Stern mit 0.3 bis 2.3
Sonnenmassen



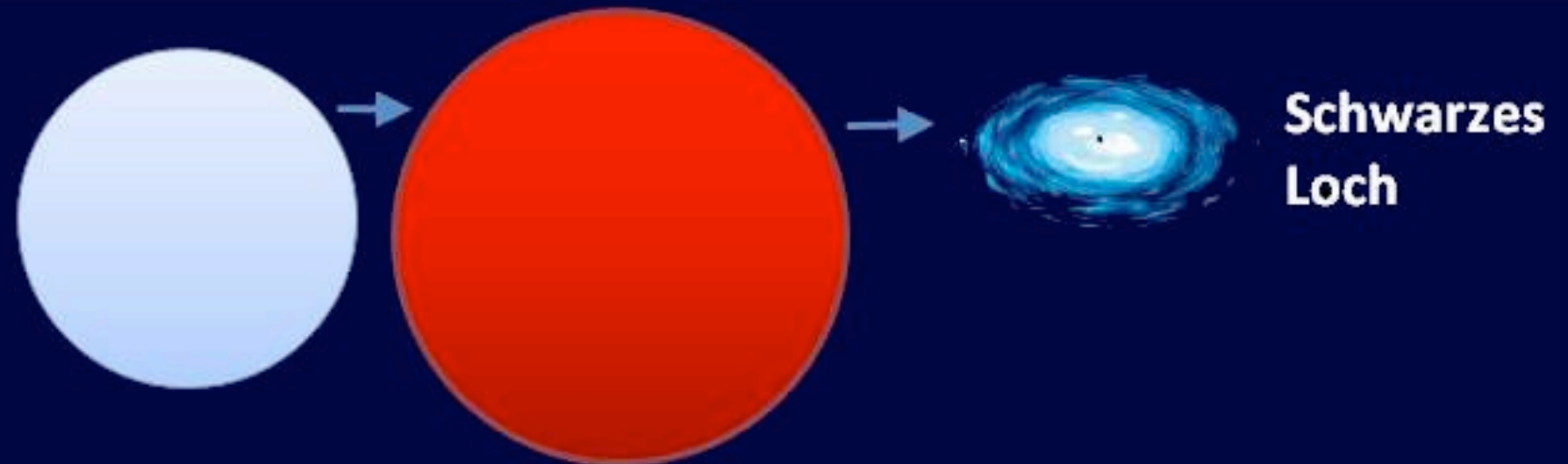
Stern mit 2.3 bis 10.5
Sonnenmassen

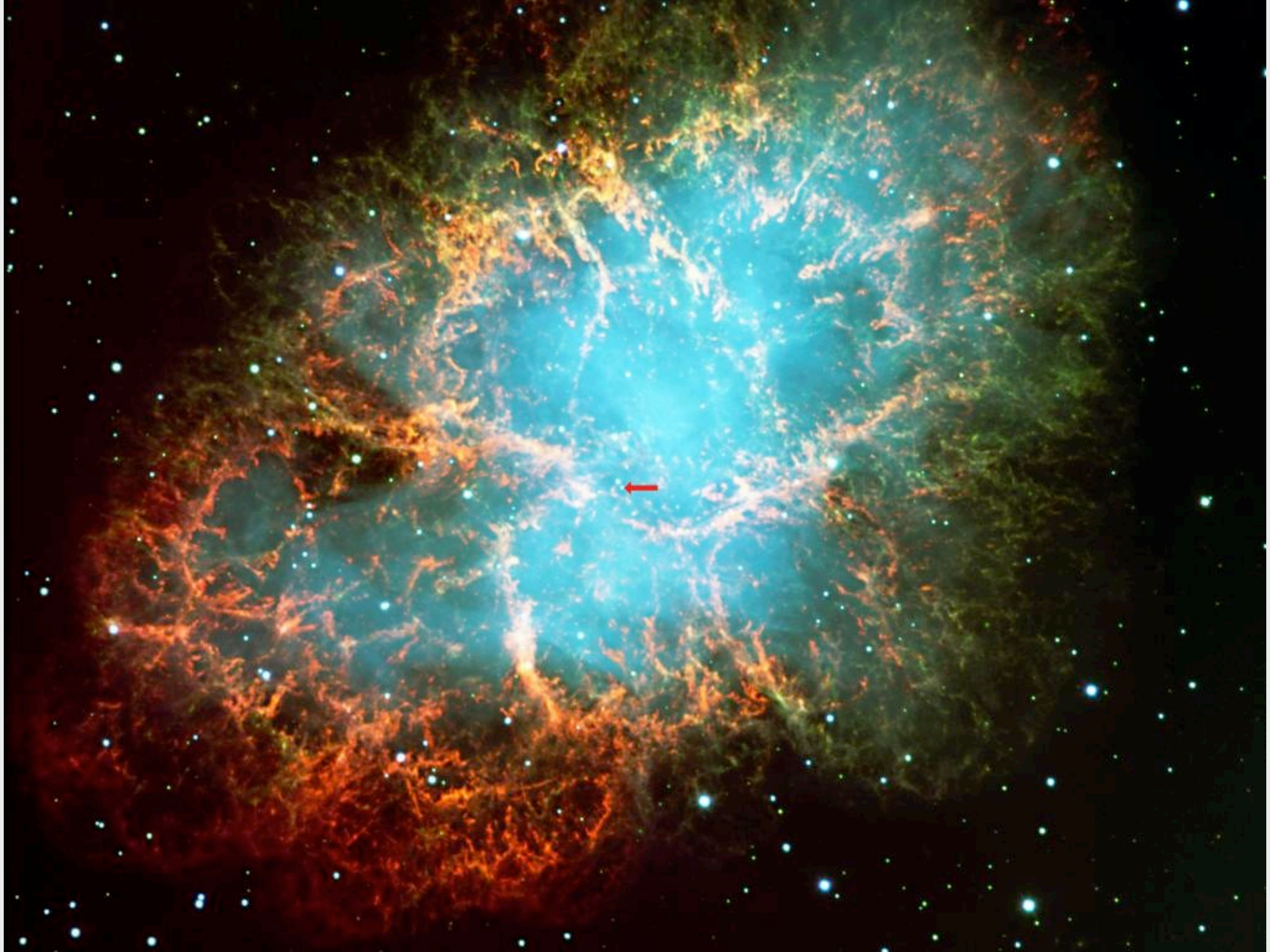


Stern über 10.5
Sonnenmassen



Stern sehr viel über 10
Sonnenmassen







Krebsnebel Pulsar, Chandra Röntgenteleskop

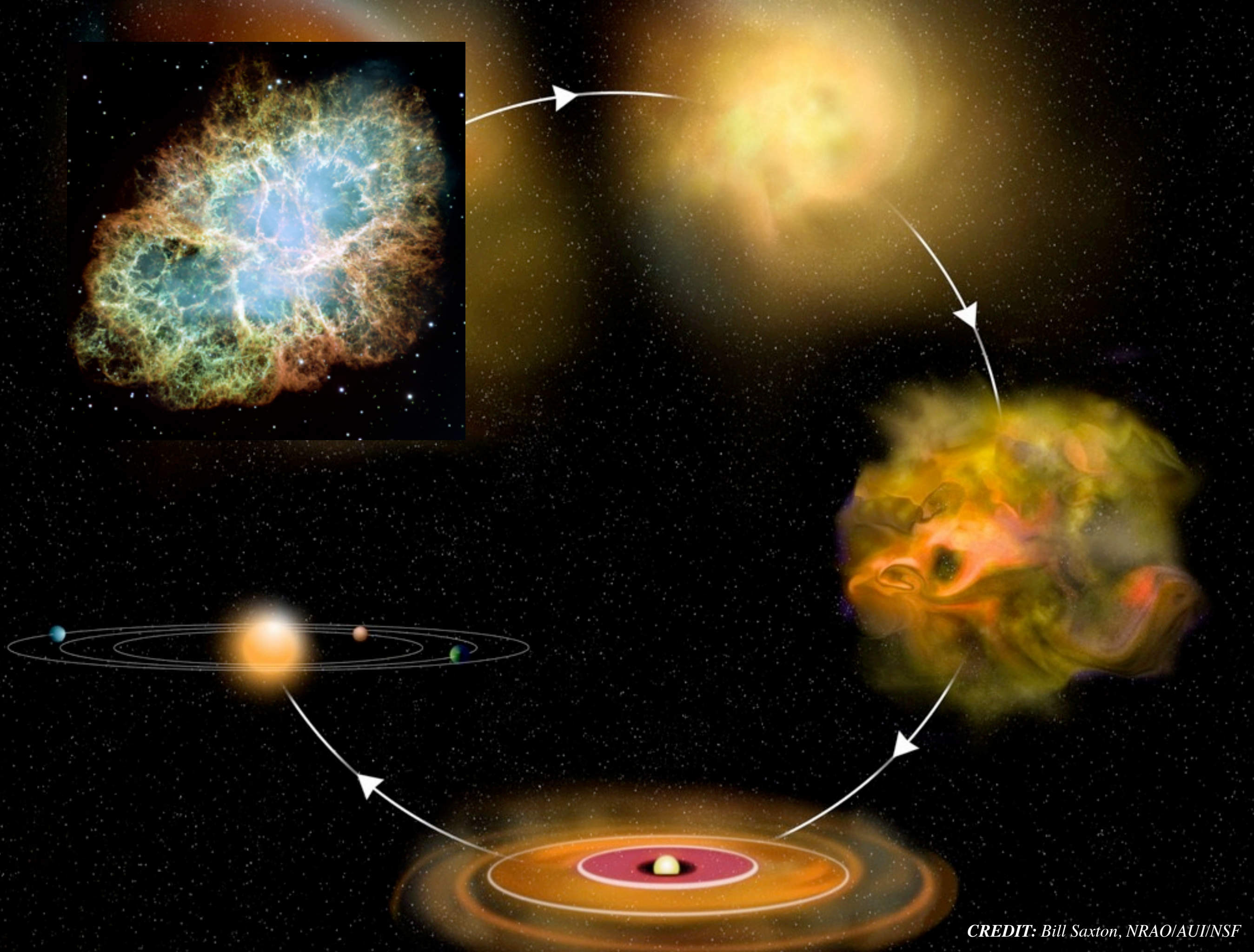


Vela-Pulsar, Fermi Gamma-Teleskop

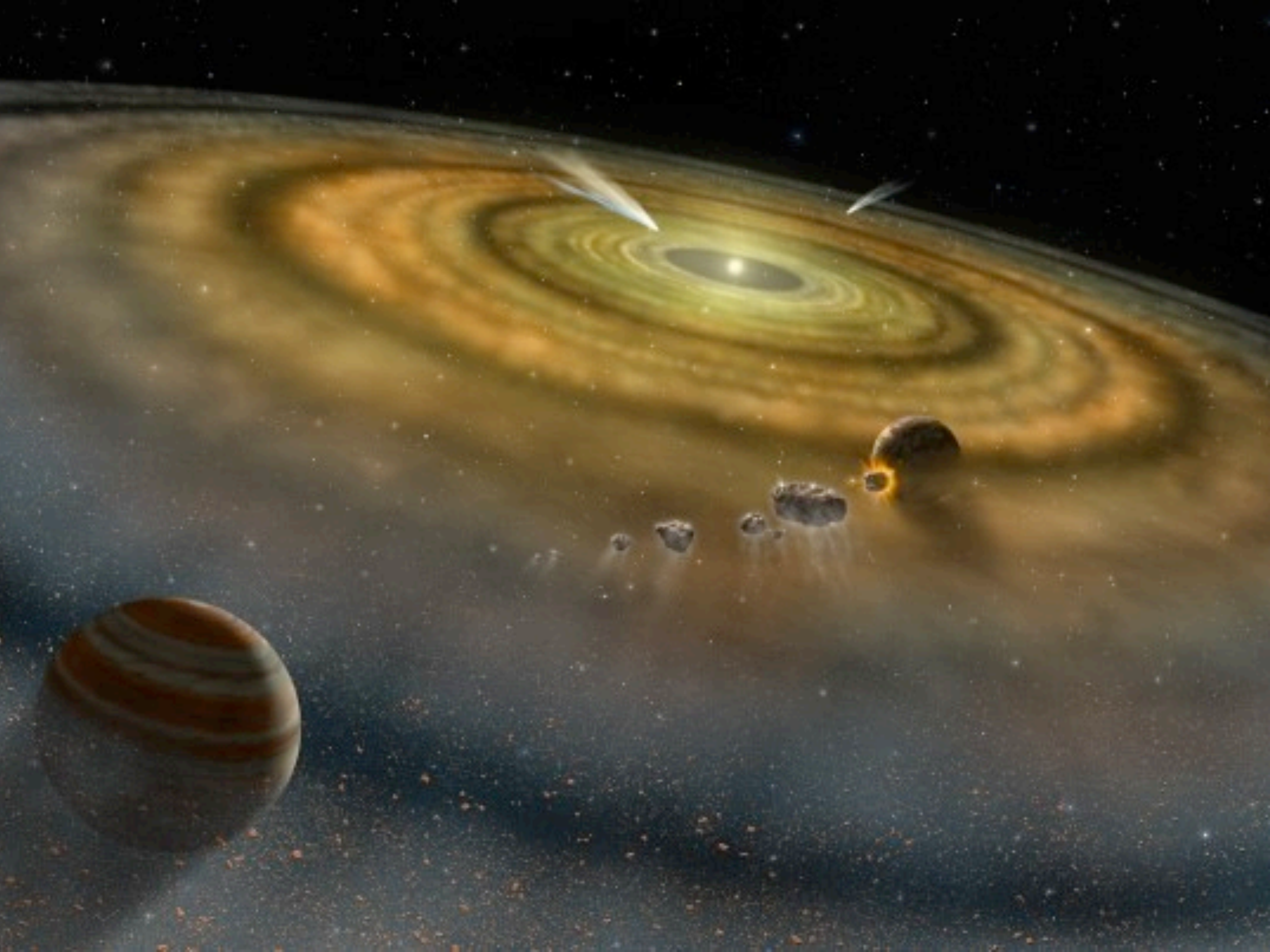
Cygnus X-1

X-Ray

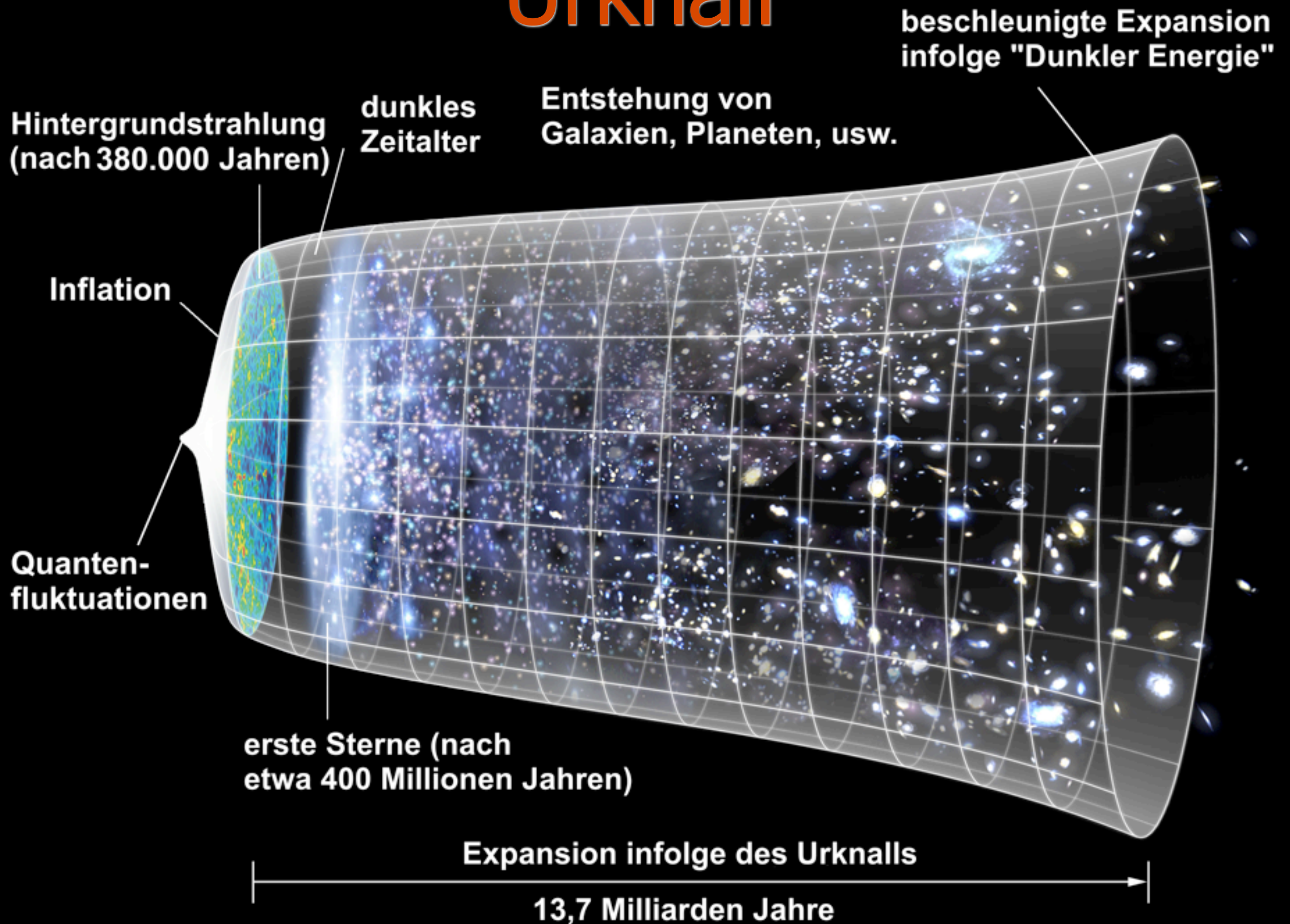
Schwarze Löcher

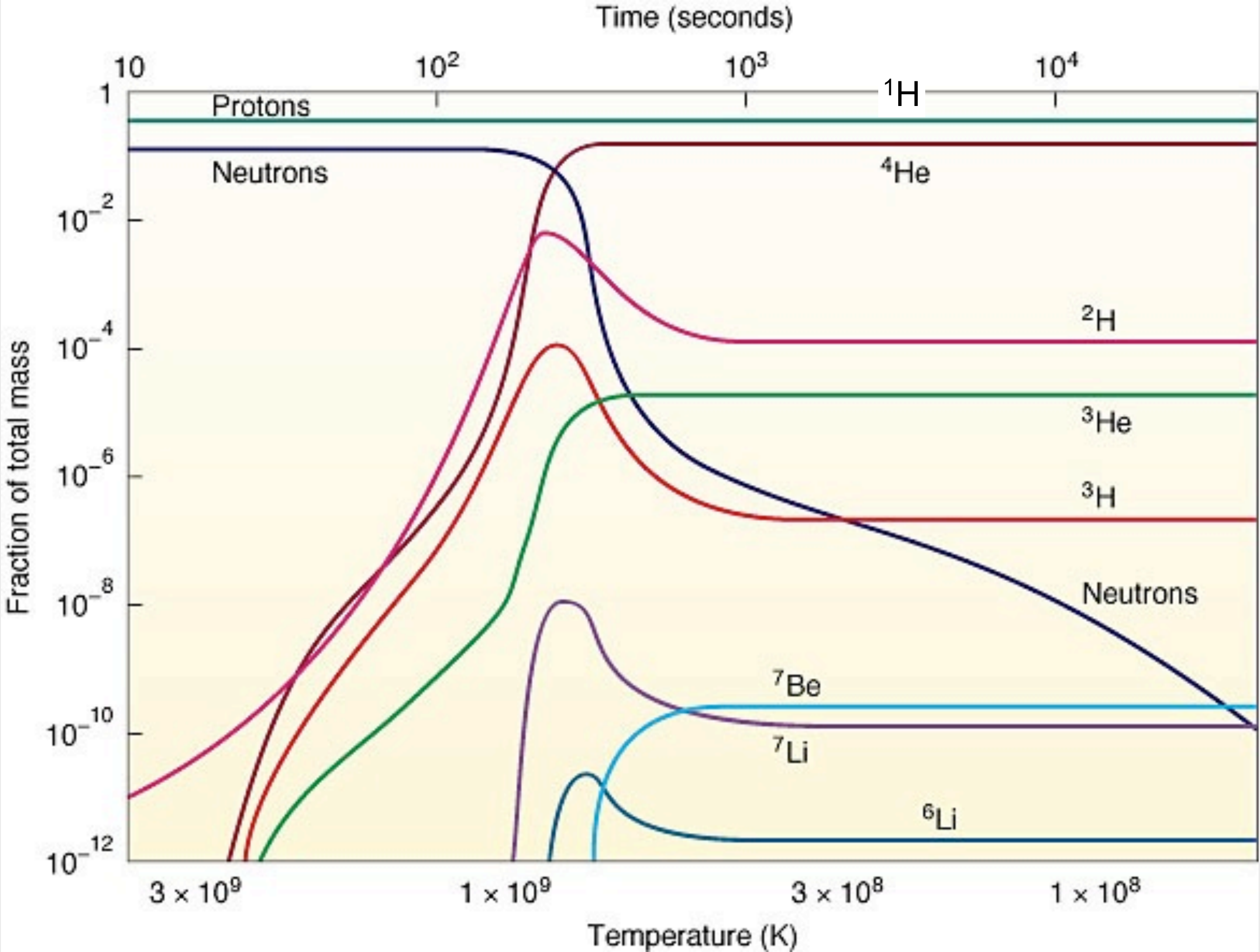


CREDIT: Bill Saxton, NRAO/AUI/NSF



Urknall





A visualization of the cosmic web, showing a complex network of glowing blue filaments and clusters of galaxies against a dark background. The filaments represent the large-scale structure of the universe, with galaxies concentrated along these lines and at their intersections.

the formation of the universe

g Bang: 0.9 billion years

Stellarer Lebenszyklus

