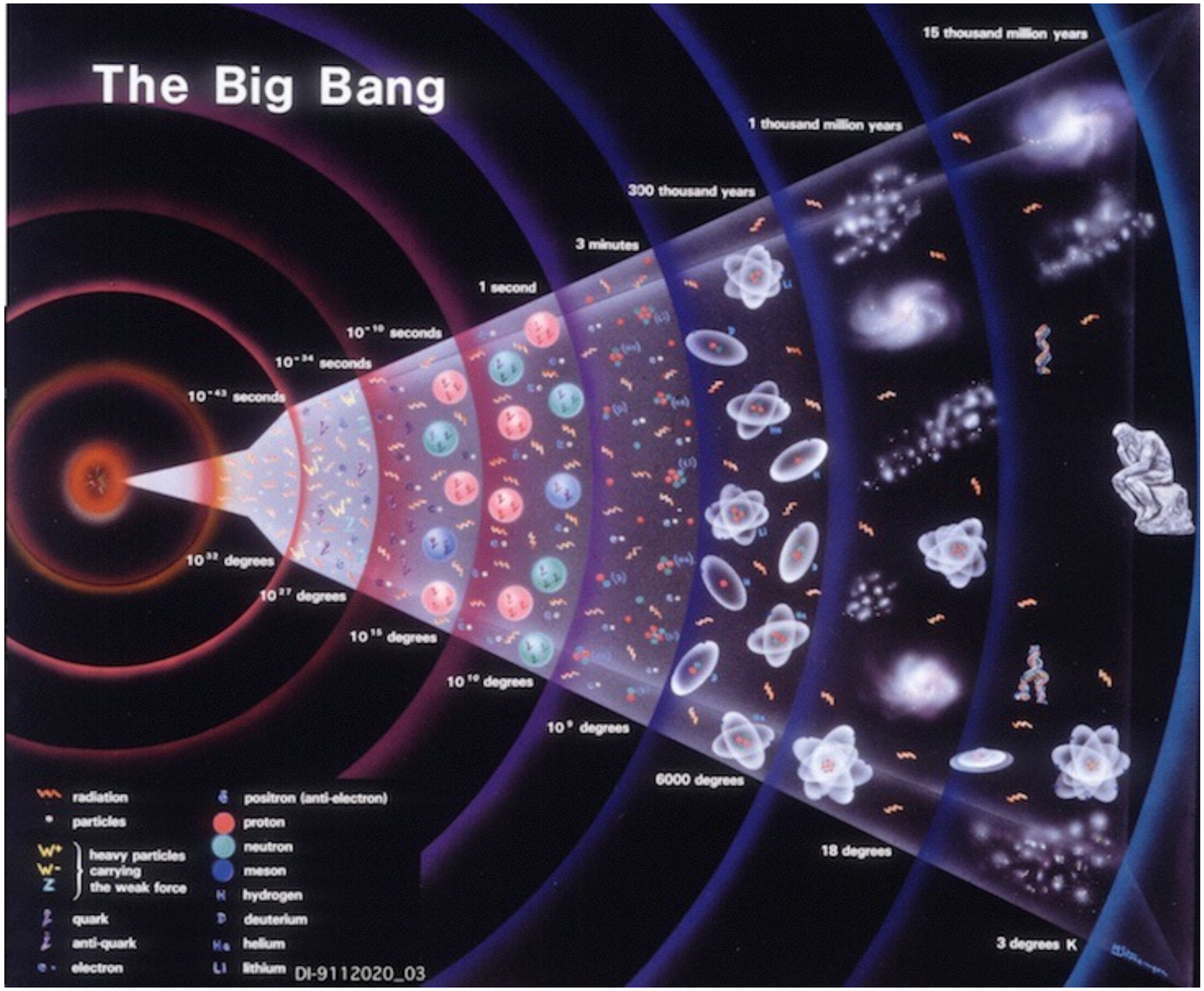
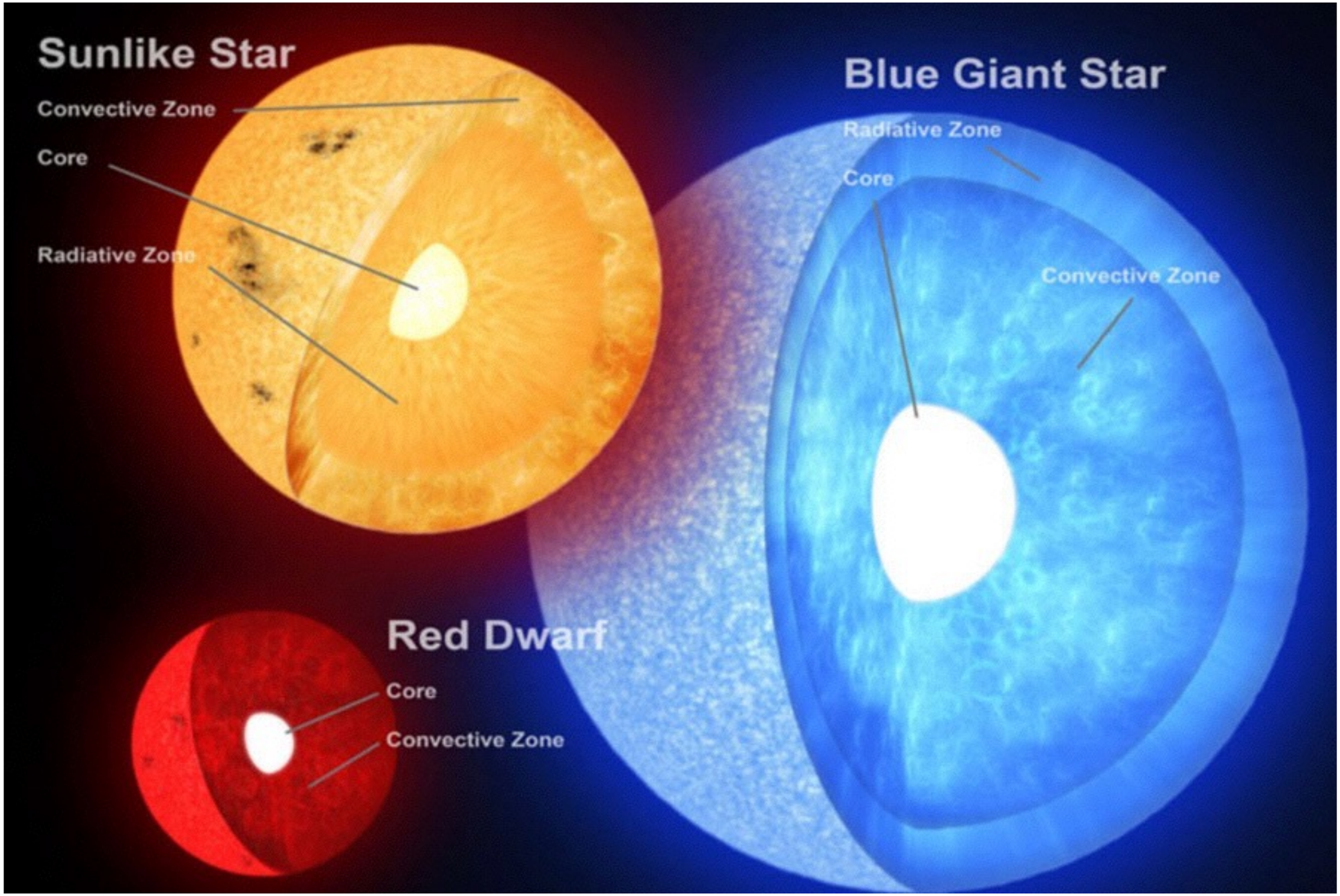
Planetary Geology

The Big Bang

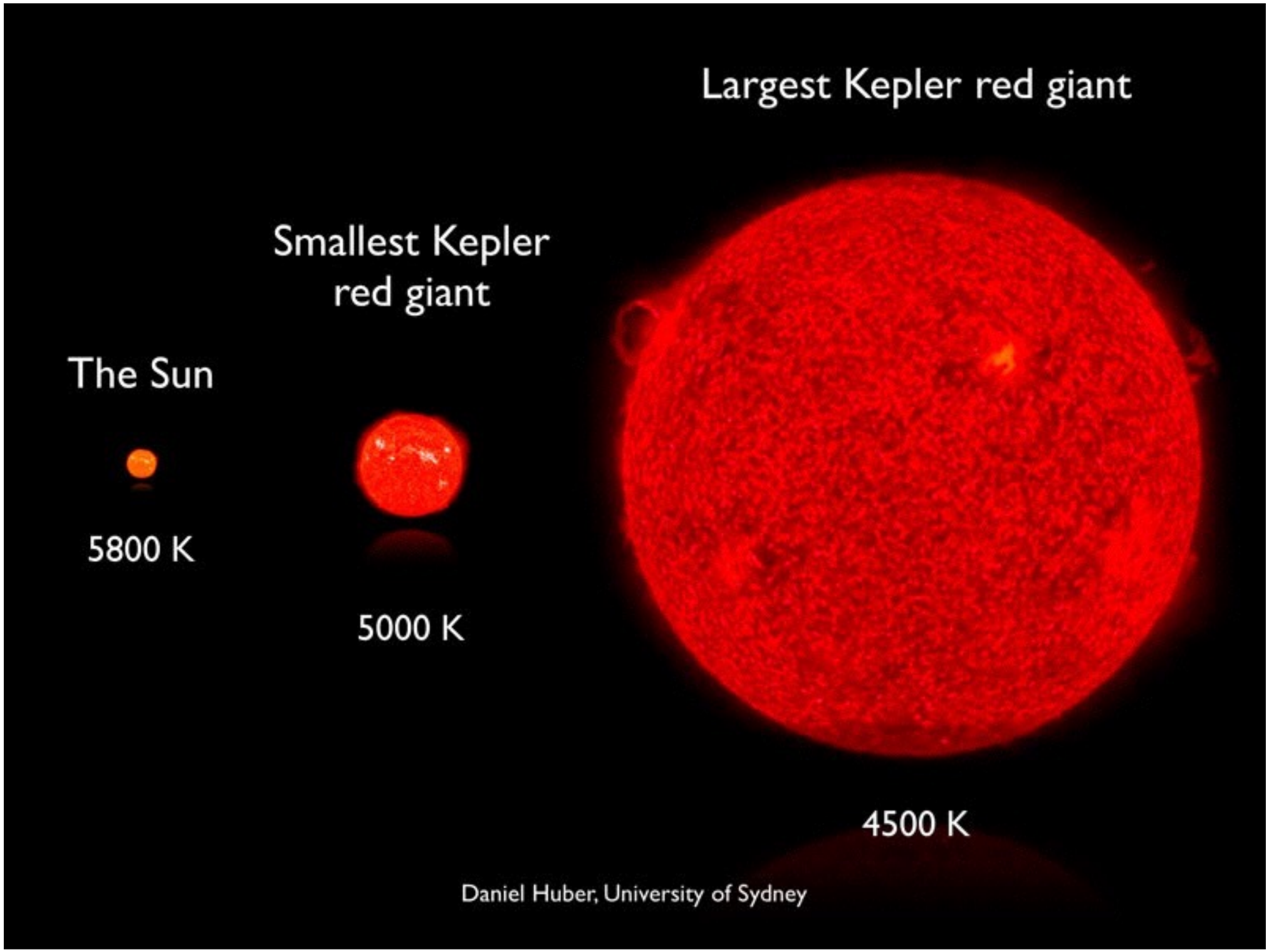

The Big Bang
15 thousand million years
1 thousand million years
300 thousand years
3 minutes
1 second
10^{-10} seconds
10^{-34} seconds
10^{-43} seconds
10^{32} degrees
10^{27} degrees
10^{15} degrees
10^{10} degrees
10^{9} degrees
6000 degrees
18 degrees
3 degrees K
radiation
particles
W+
W-
Z
heavy particles carrying the weak force
quark
anti-quark
electron
positron (anti-electron)
proton
neutron
meson
H hydrogen
D deuterium
He helium
Li lithium
DI-9112020_03

The Birth of a Star

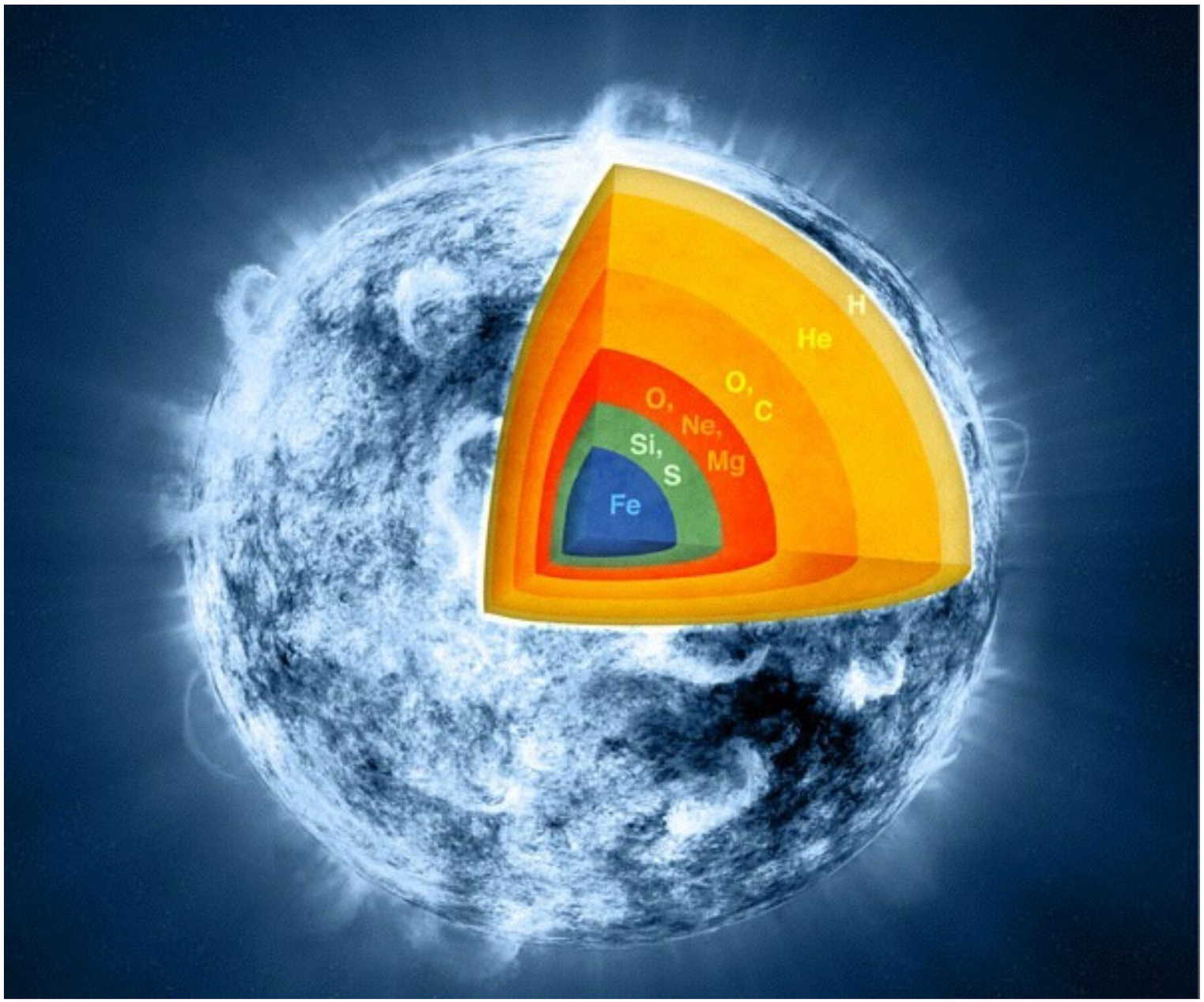
The Interior of Stars



The Sun - A Red Giant ?



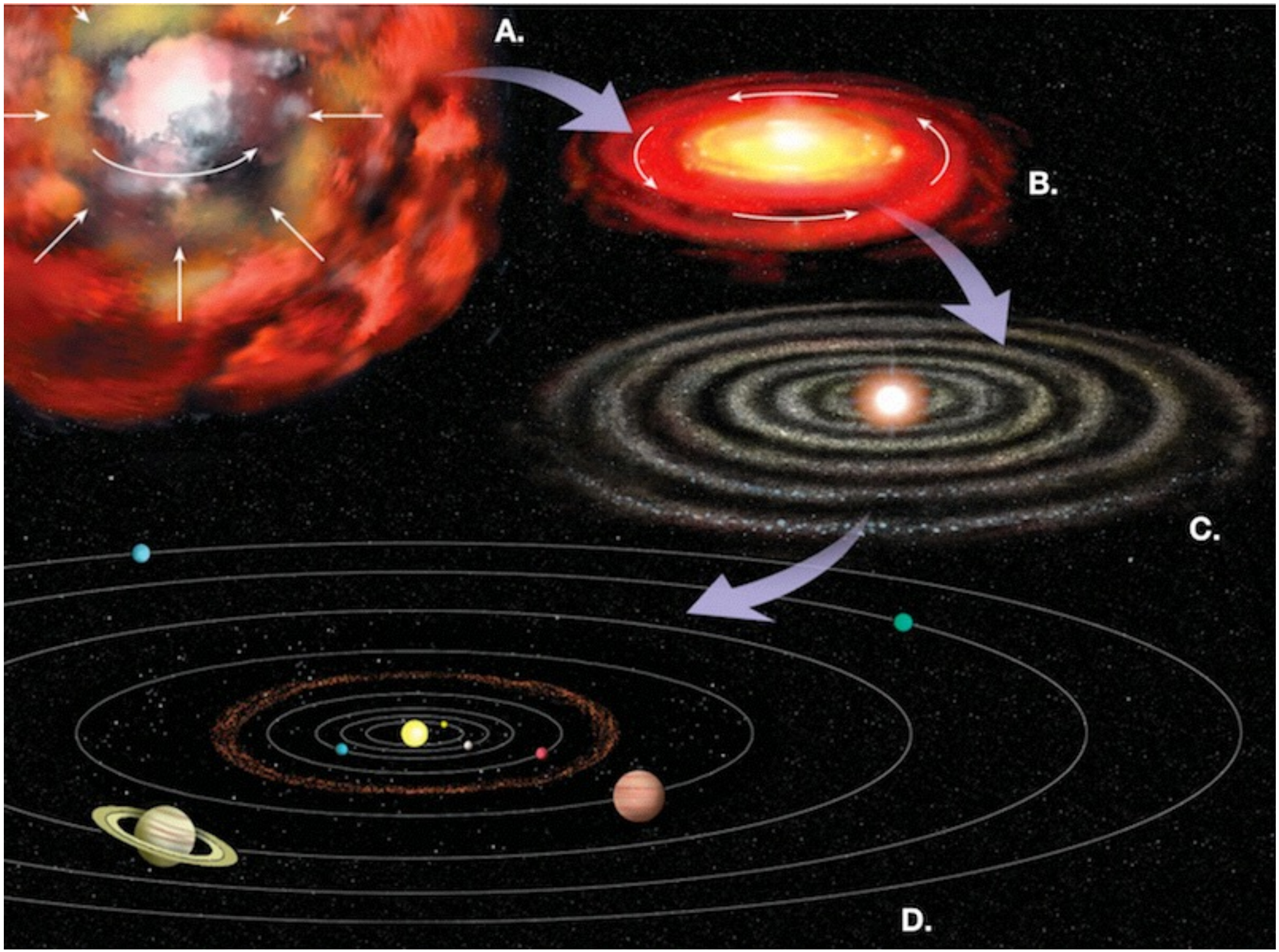
Nucleosynthesis in Massive Stars



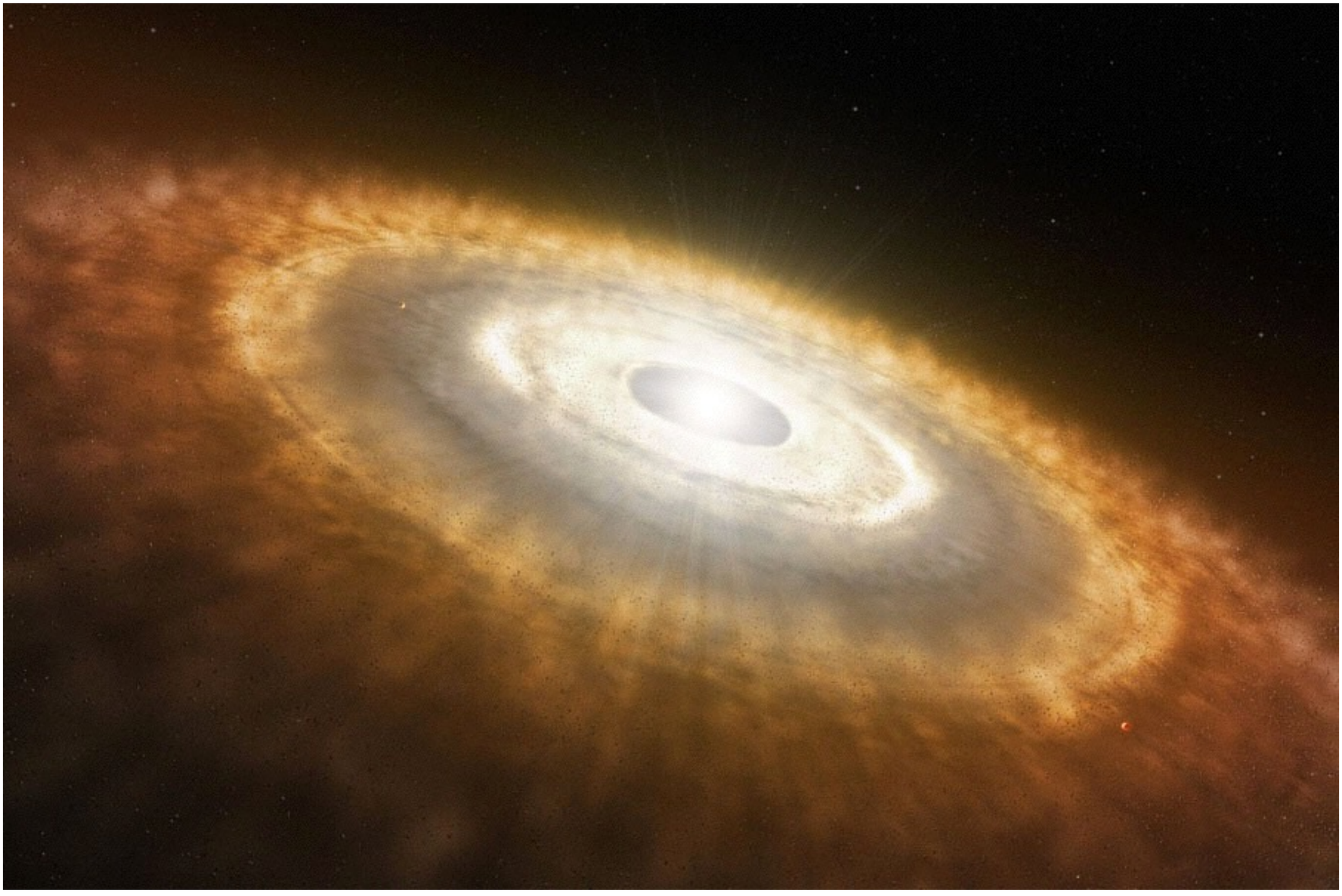
The Supernova of a Massive Star

The Shockwave from a Supernova

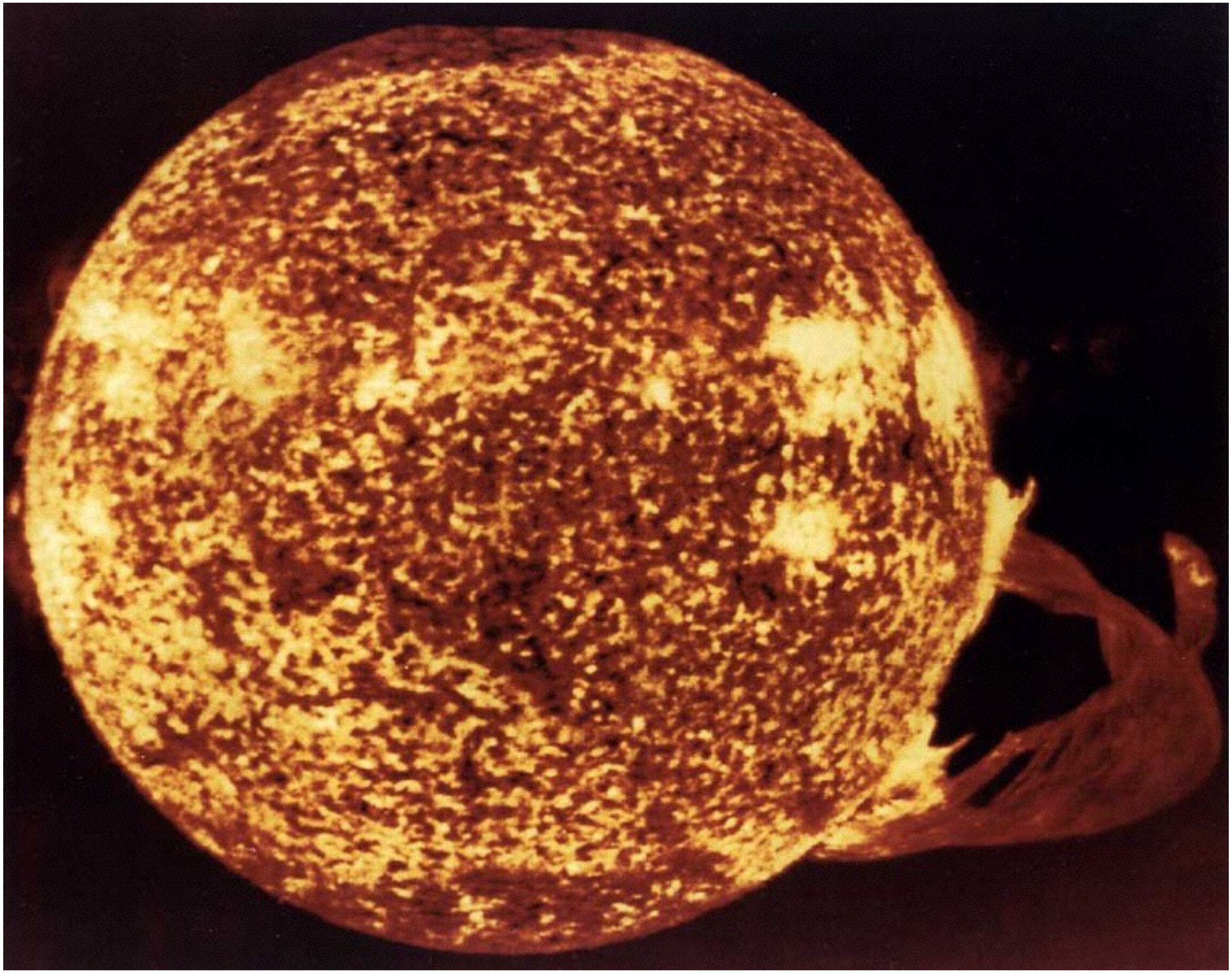
Solar Nebula Hypothosis



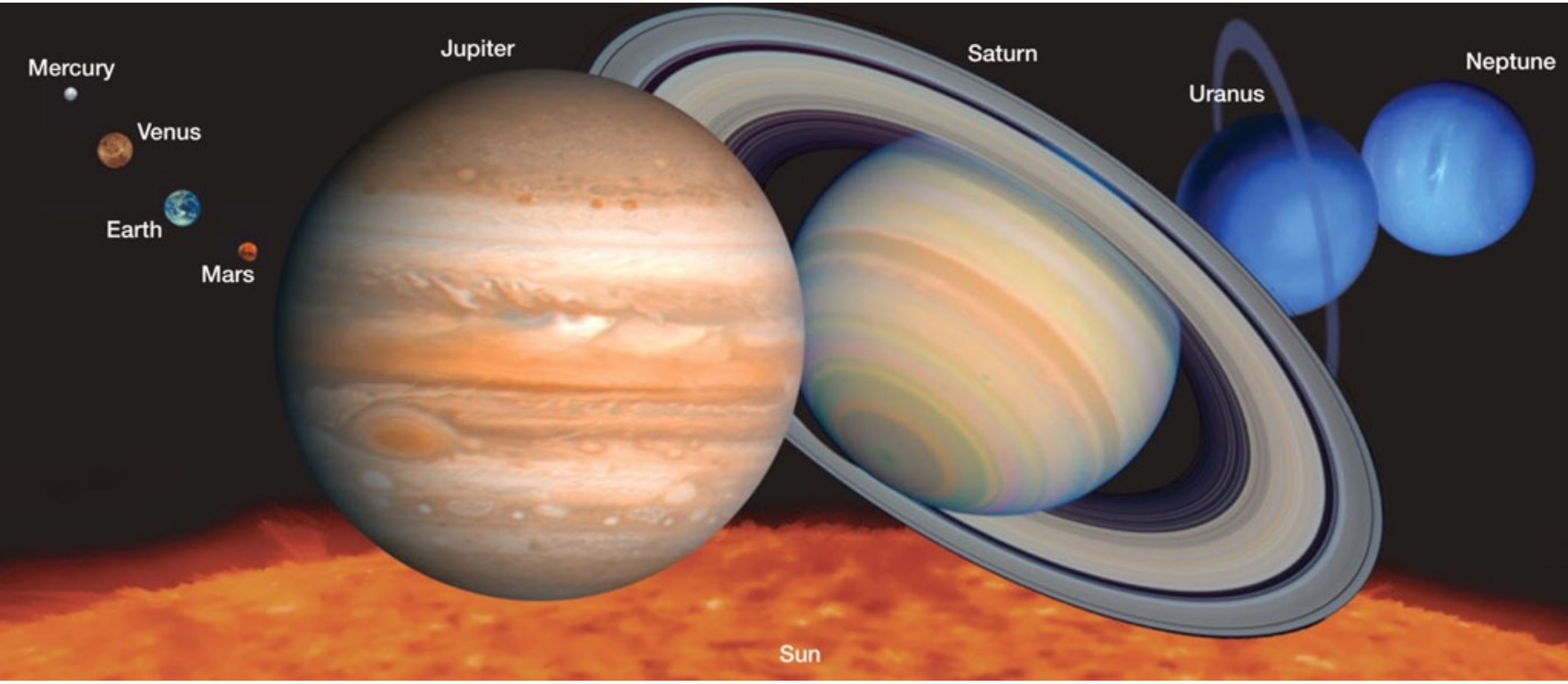
Protoplanetary Disk



‘Sol’ - Our Sun



The Planets (to scale)



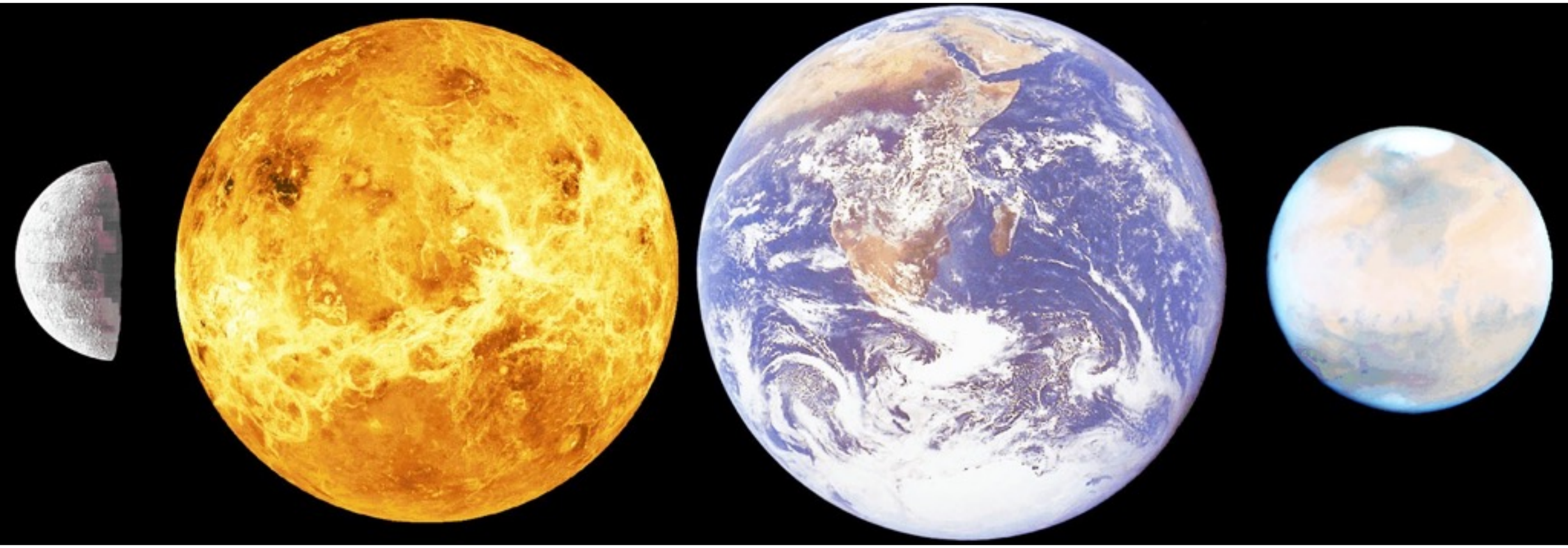
Planetary Data

Planet	Symbol	AU*	Mean Distance from Sun: Millions of Miles	Mean Distance from Sun: Millions of Kilometers	Period of Revolution
Mercury	☿	0.39	36	58	88^{d}
Venus	♀	0.72	67	108	225^{d}
Earth	⊕	1.00	93	150	365.25^{d}
Mars	♂	1.52	142	228	687^{d}
Jupiter	♃	5.20	483	778	12^{yr}
Saturn	♄	9.54	886	1427	30^{yr}
Uranus	♅	19.18	1783	2870	84^{yr}
Neptune	♆	30.06	2794	4497	165^{yr}

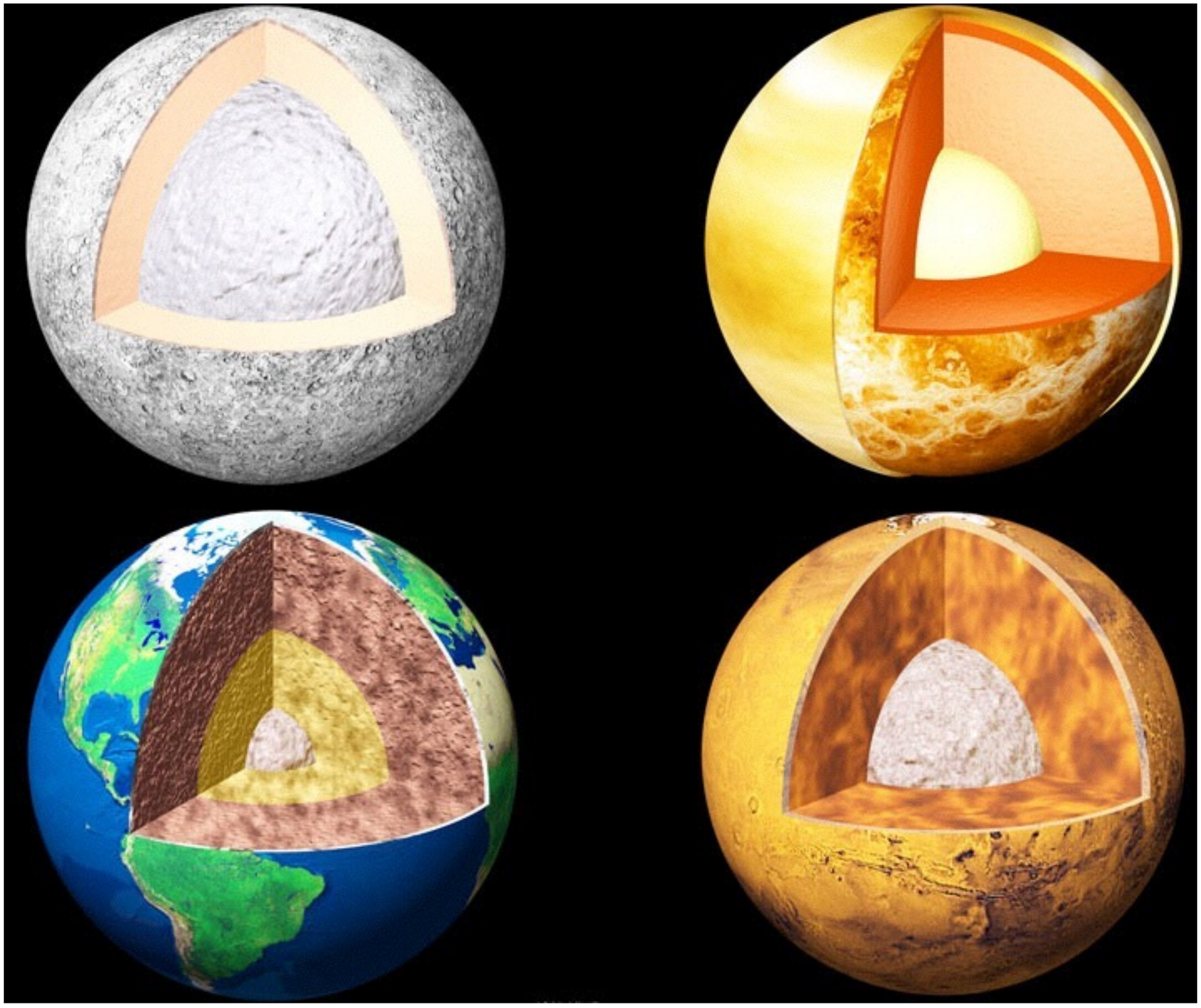
Planet	Period of Rotation	Diameter: Miles	Diameter: Kilometers	Relative Mass (Earth = 1)	Average Density (g/cm^3)
Mercury	59^{d}	3015	4878	0.06	5.4
Venus	243^{d}	7526	12,104	0.82	5.2
Earth	$23^{h}56^{m}04^{s}$	7920	12,756	1.00	5.5
Mars	$24^{h}37^{m}23^{s}$	4216	6794	0.11	3.9
Jupiter	$9^{h}56^{m}$	88,700	143,884	317.87	1.3
Saturn	$10^{h}30^{m}$	75,000	120,536	95.14	0.7
Uranus	$17^{h}14^{m}$	29,000	51,118	14.56	1.2
Neptune	$16^{h}07^{m}$	28,900	50,530	17.21	1.7

AU = astronomical unit, Earth's mean distance from the Sun.

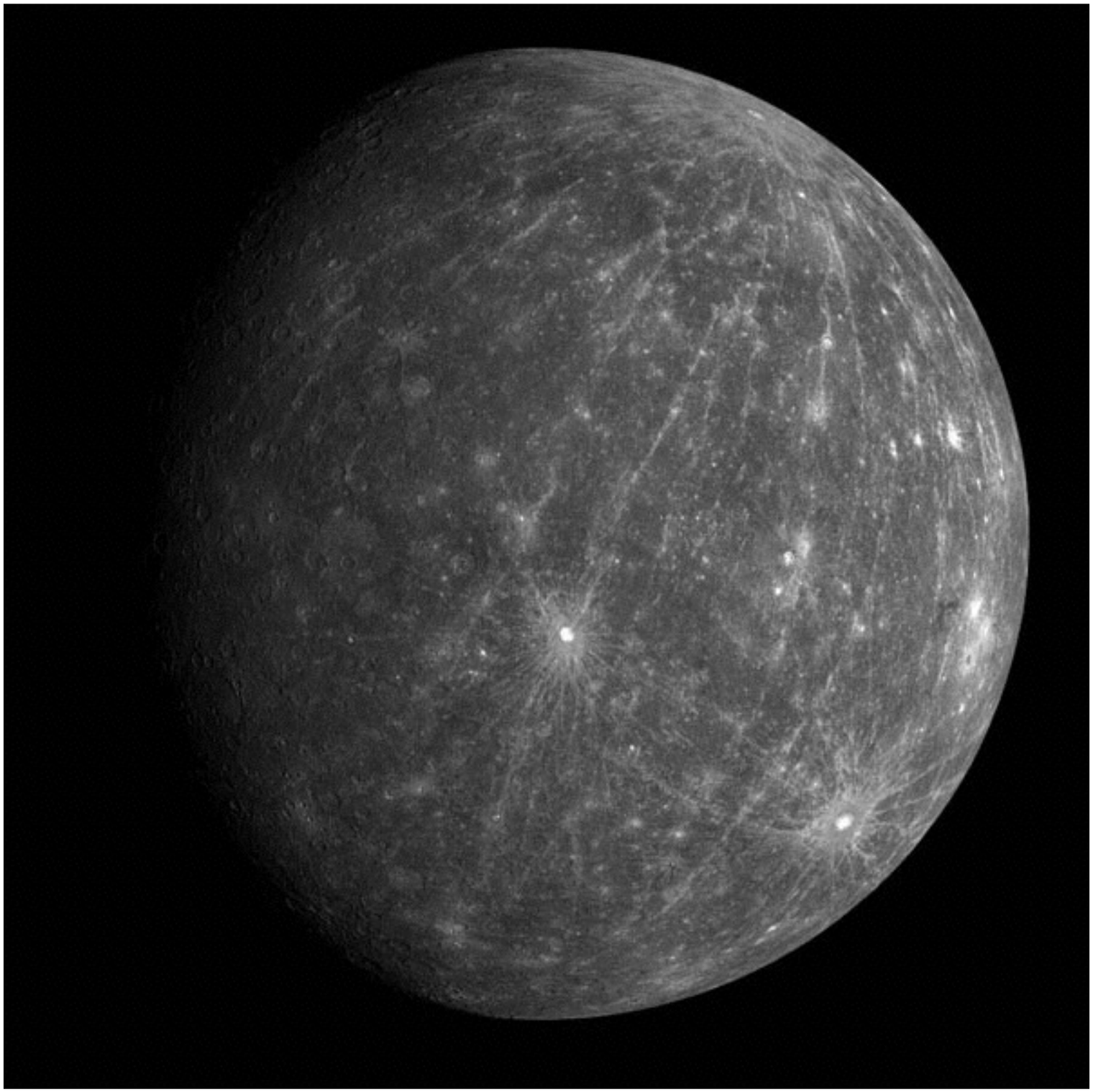
The Terrestrial Planets



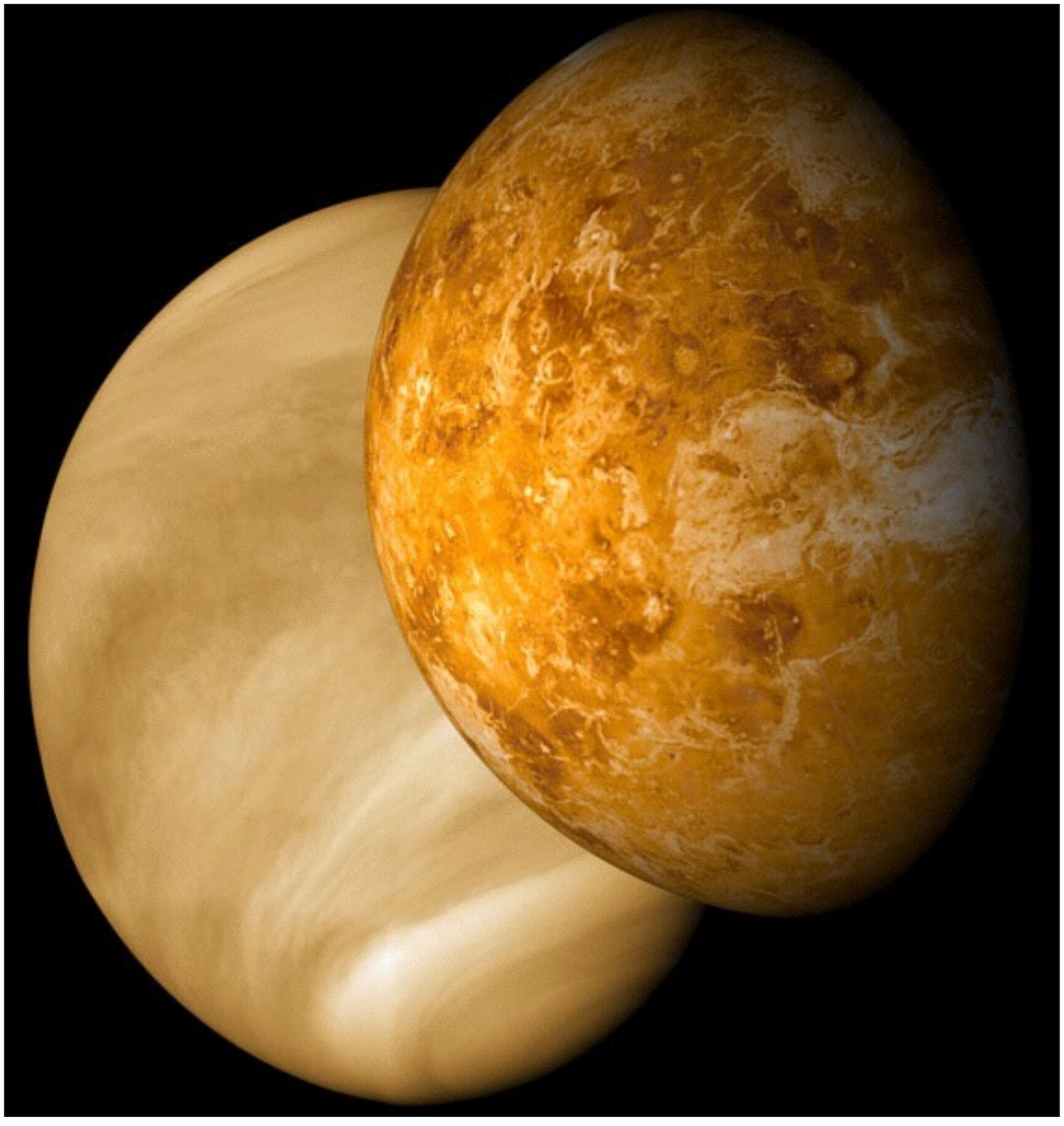
Terrestrial Planet Interiors



Mercury



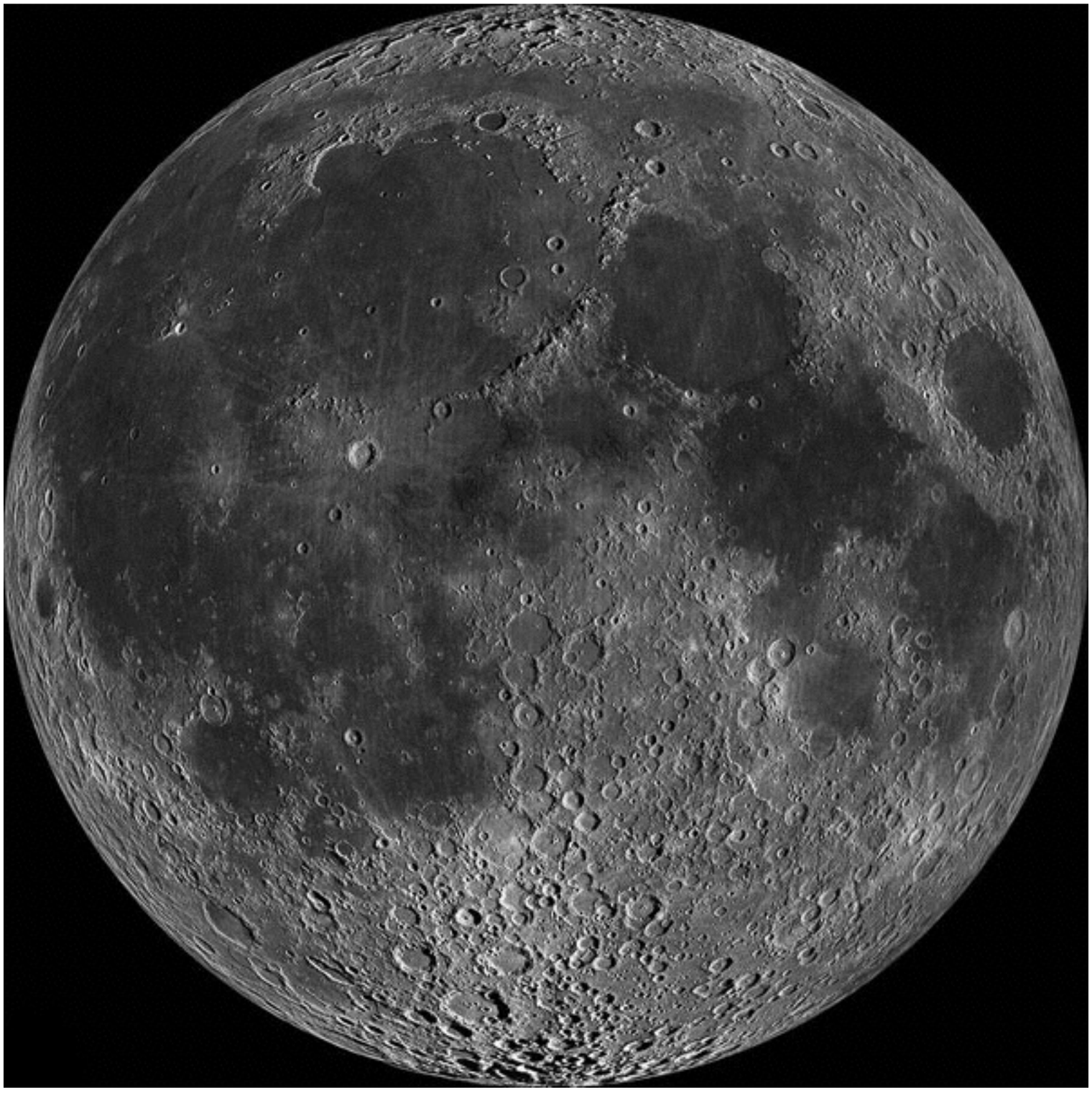
Venus (visible and radar images)



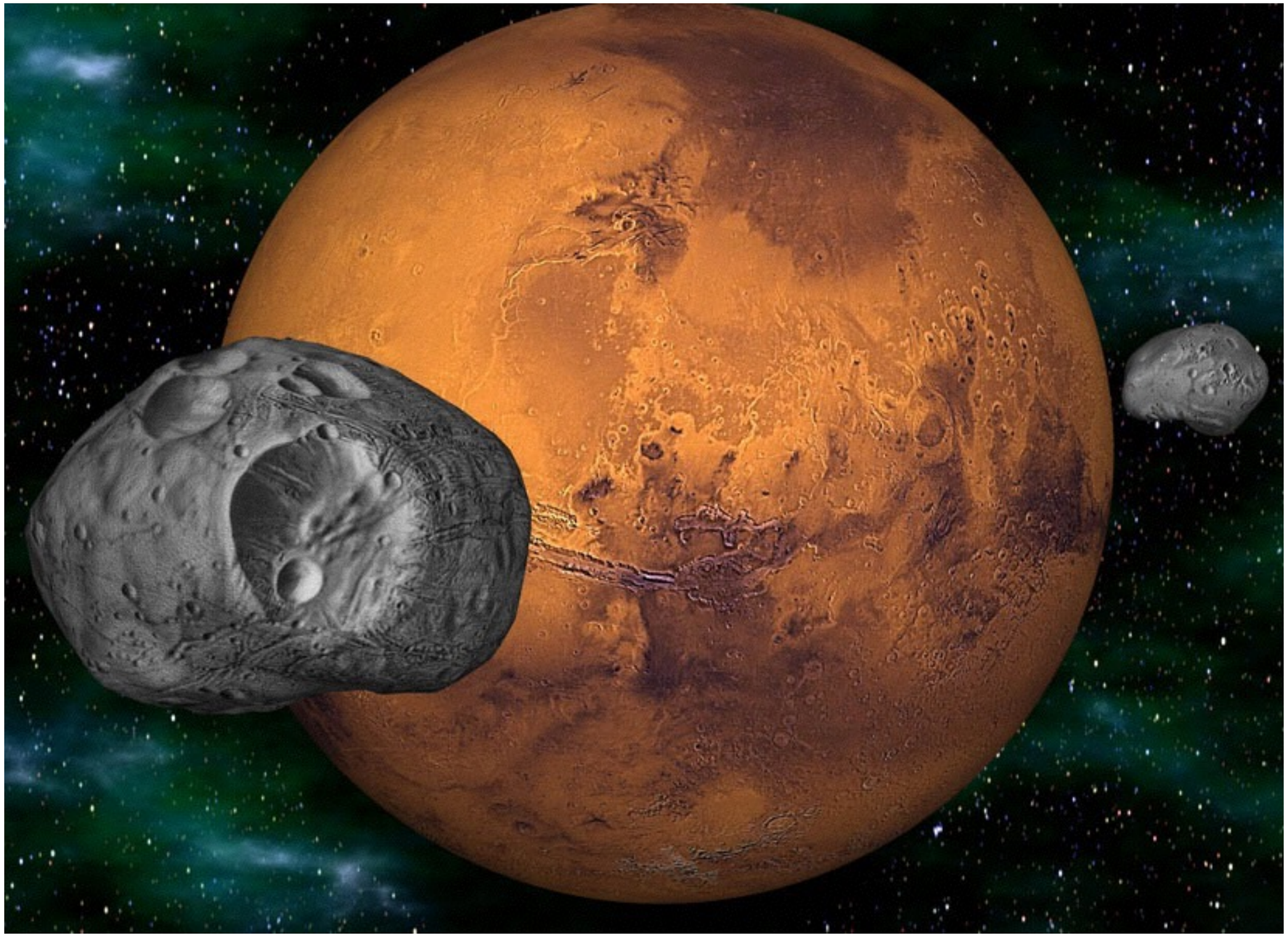
Earth - The Big Blue Ball

Earth - Moon System

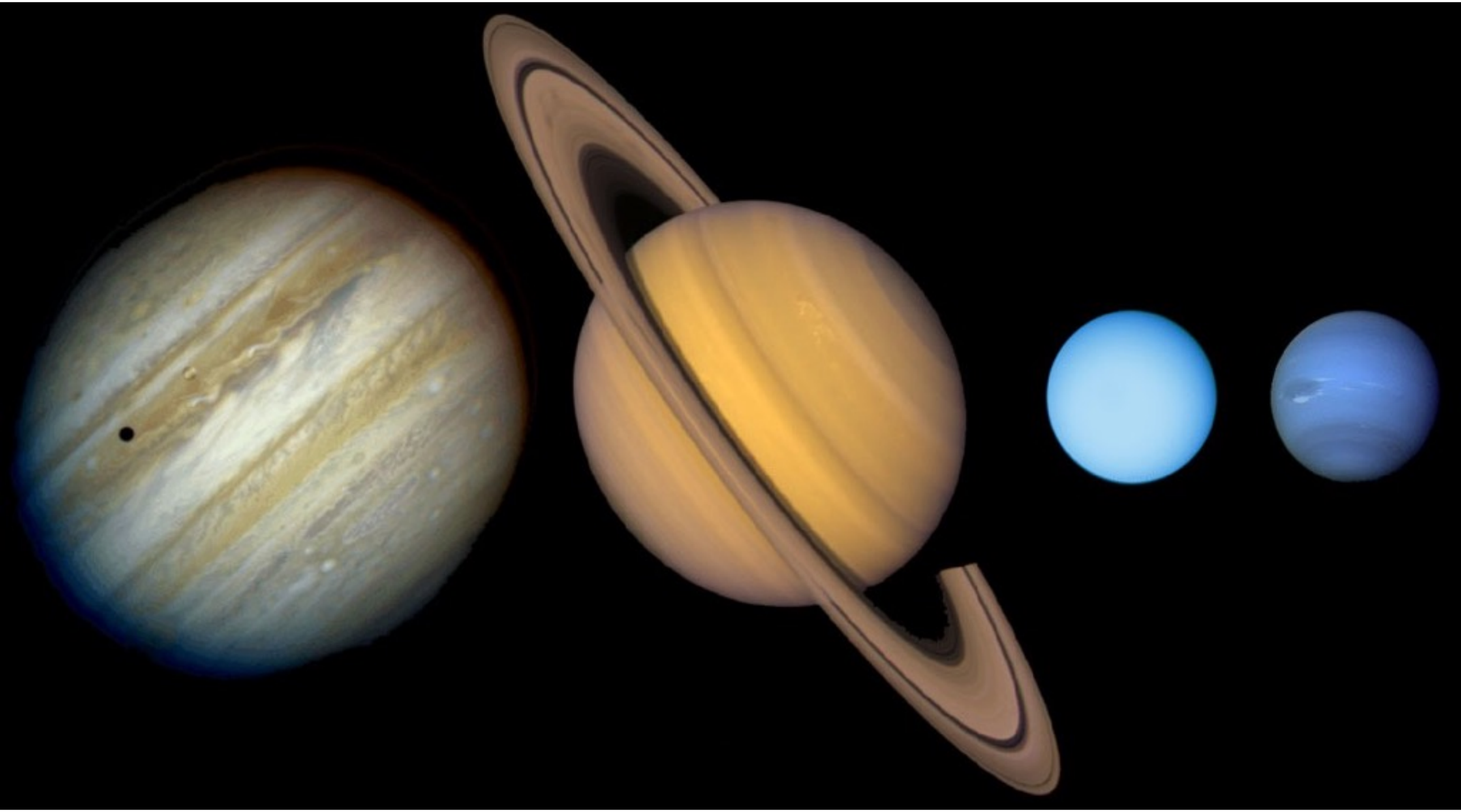
The Moon



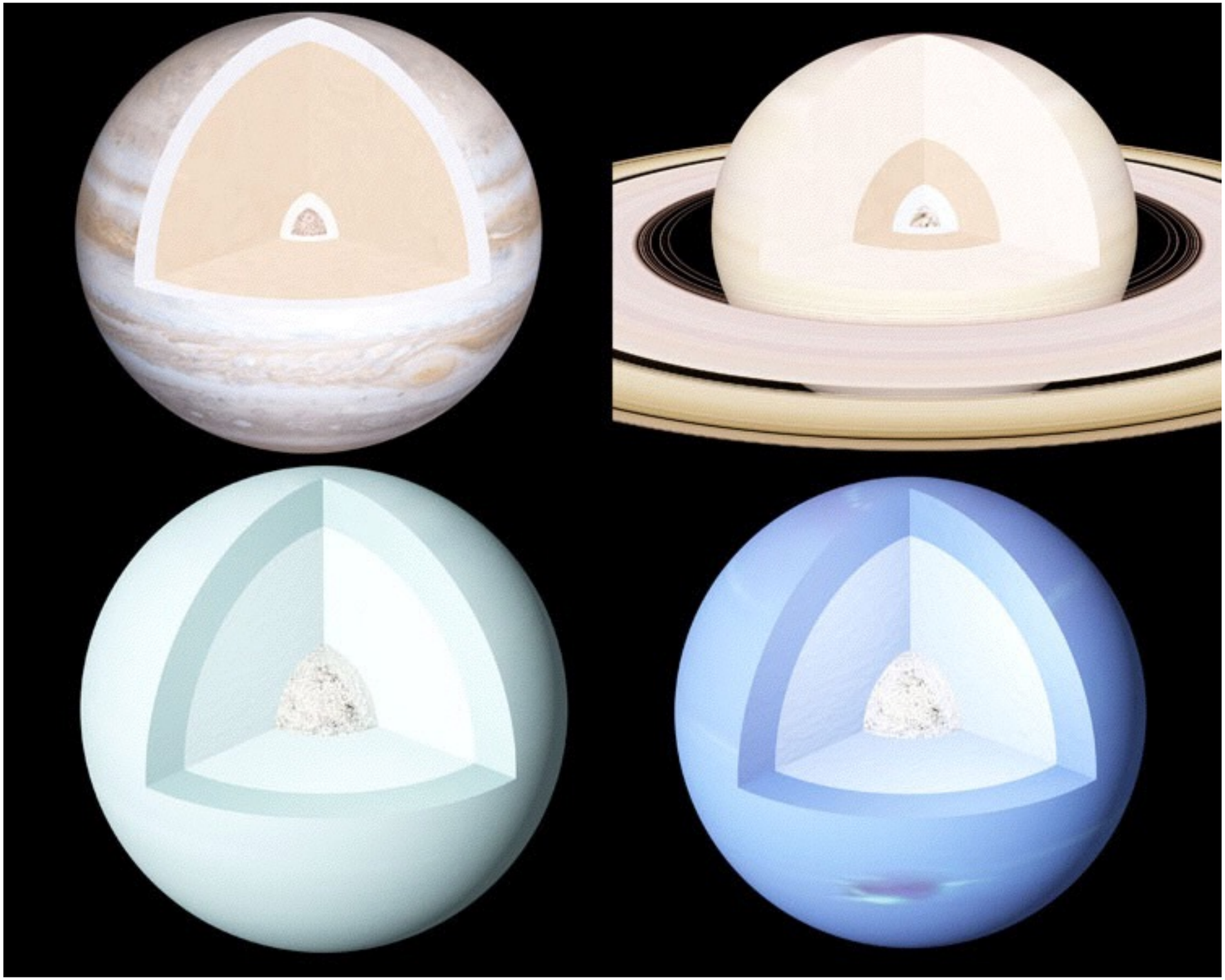
Mars with Deimos and Phobos



The Gas Giant (Jovian) Planets

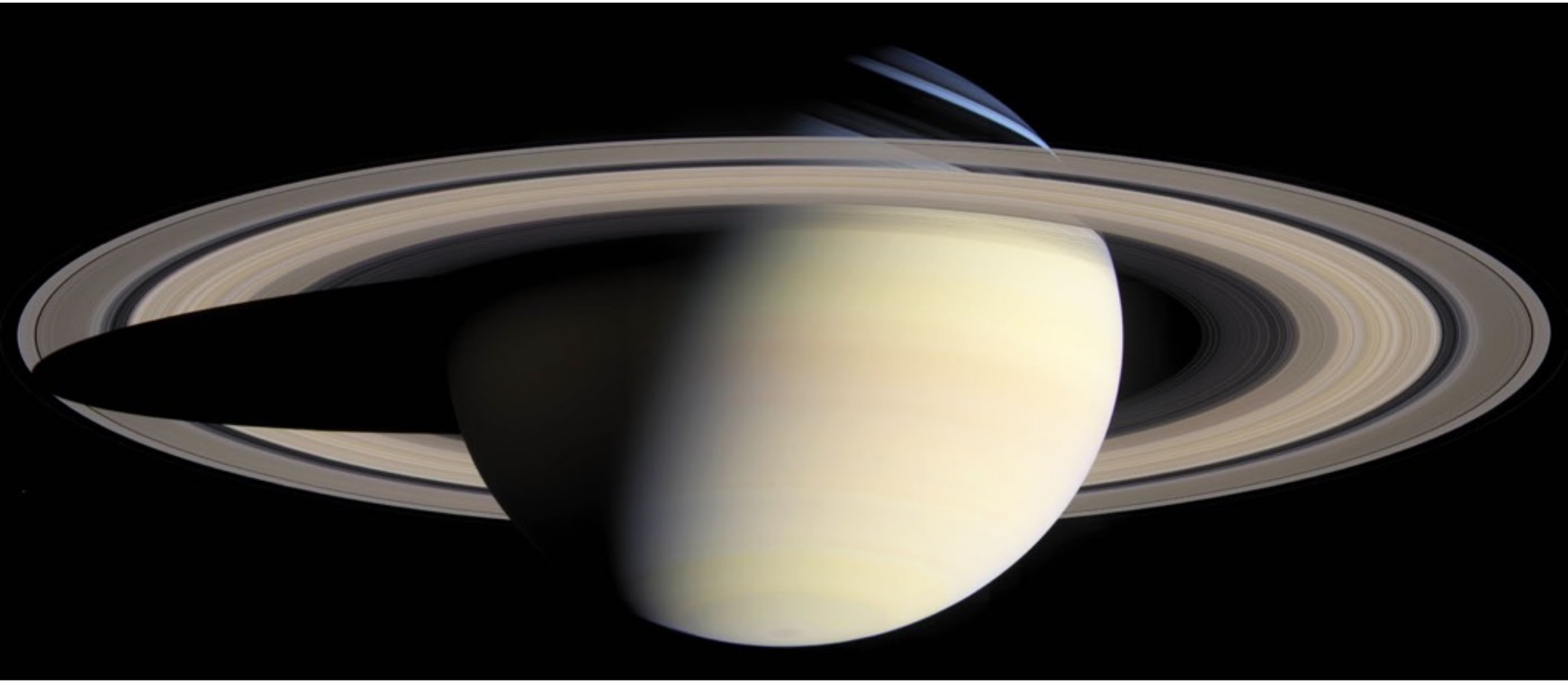


Jovian Interiors

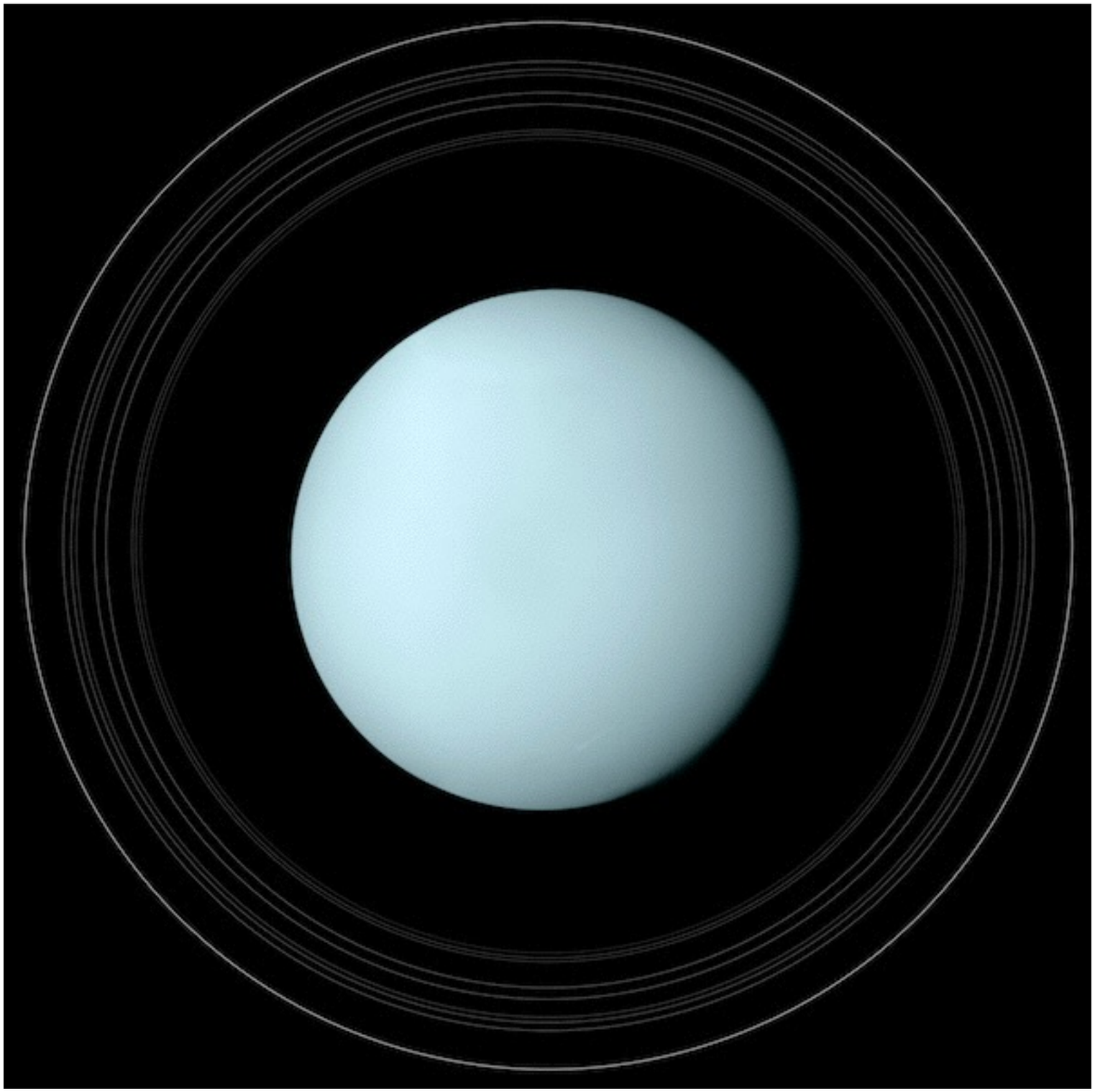


The Jupiter ‘System’

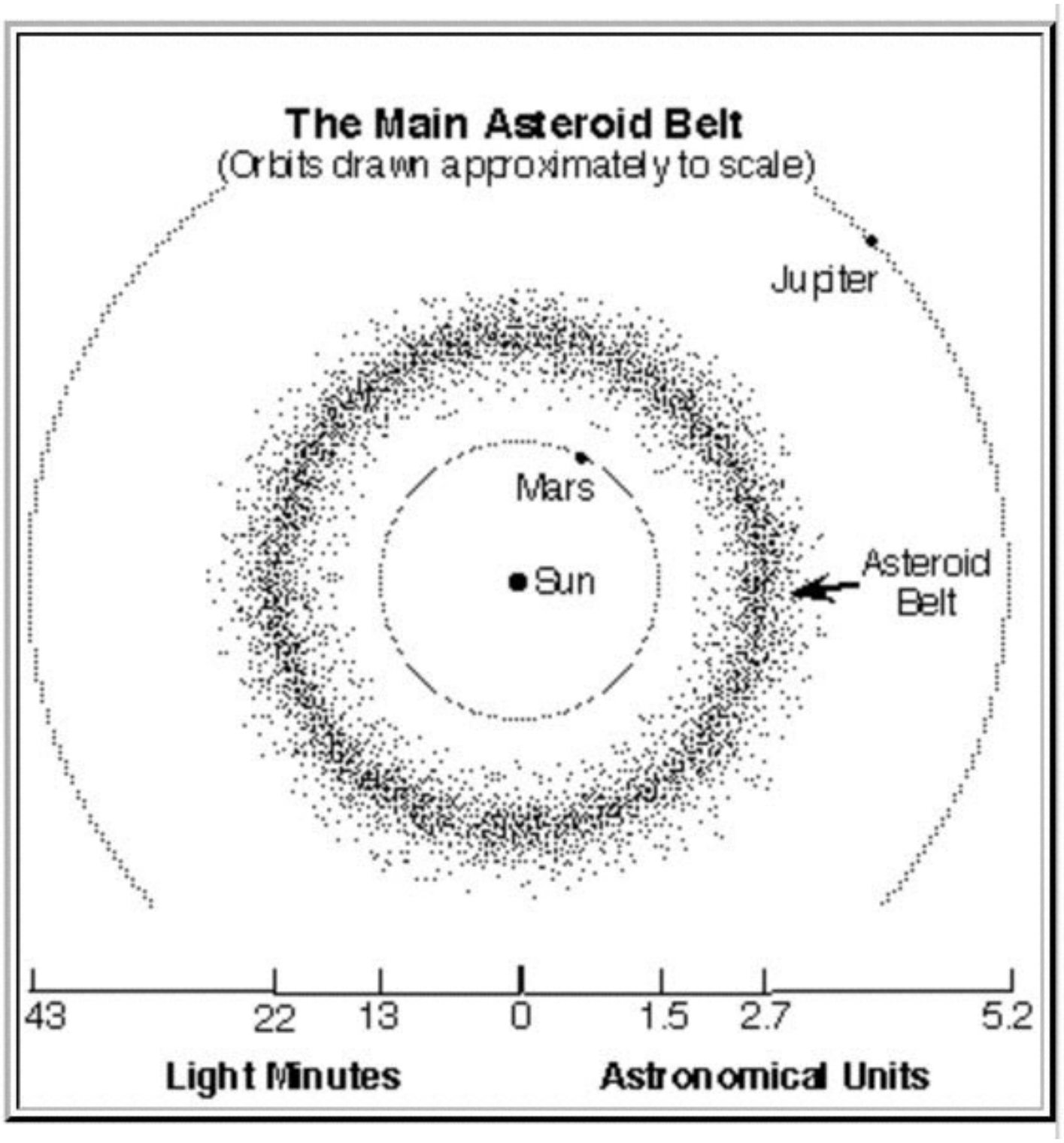
Saturn



Uranus with Rings



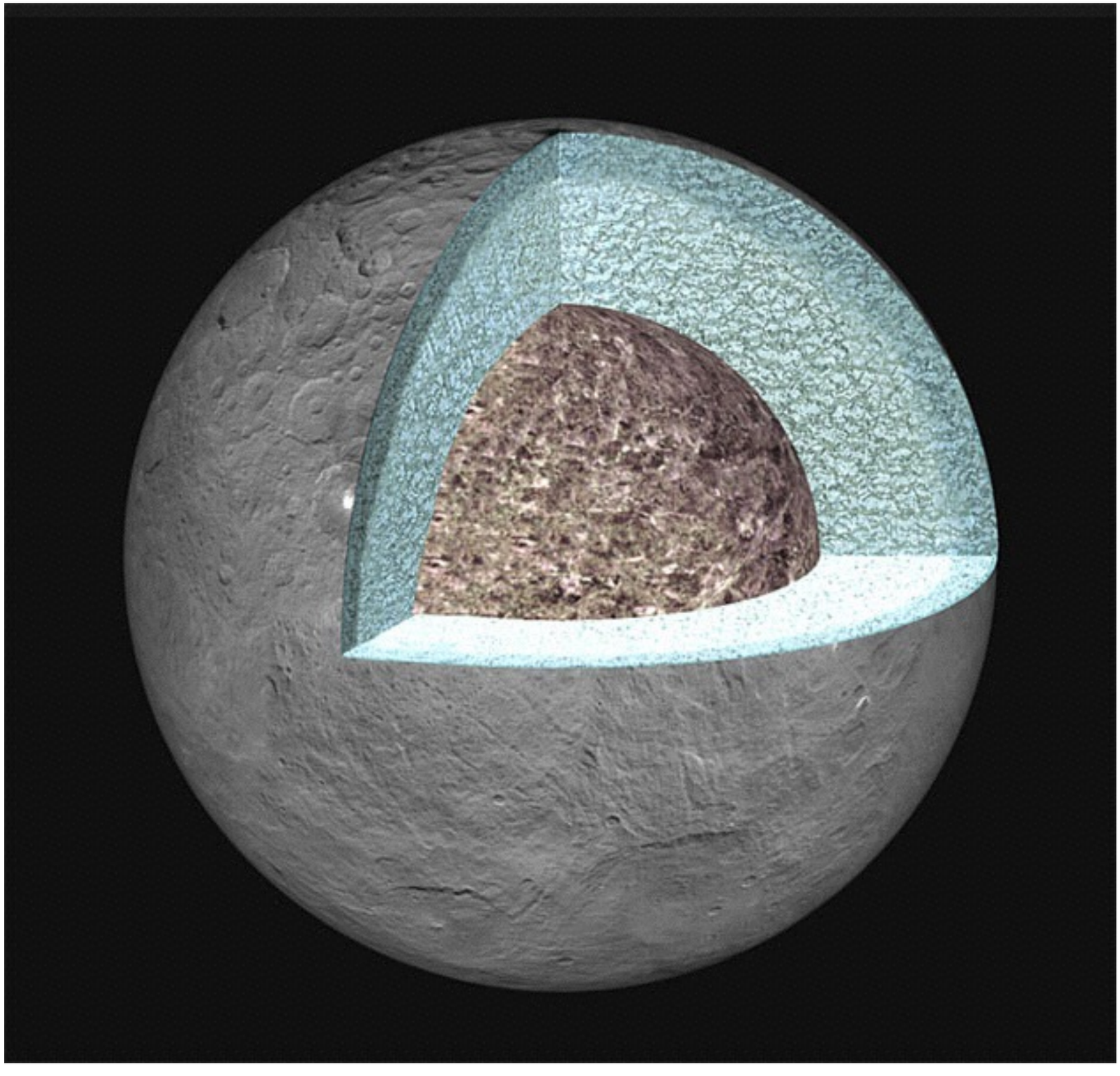
Small Solar System Bodies - the Asteroid Belt



Asteroid Gaspra

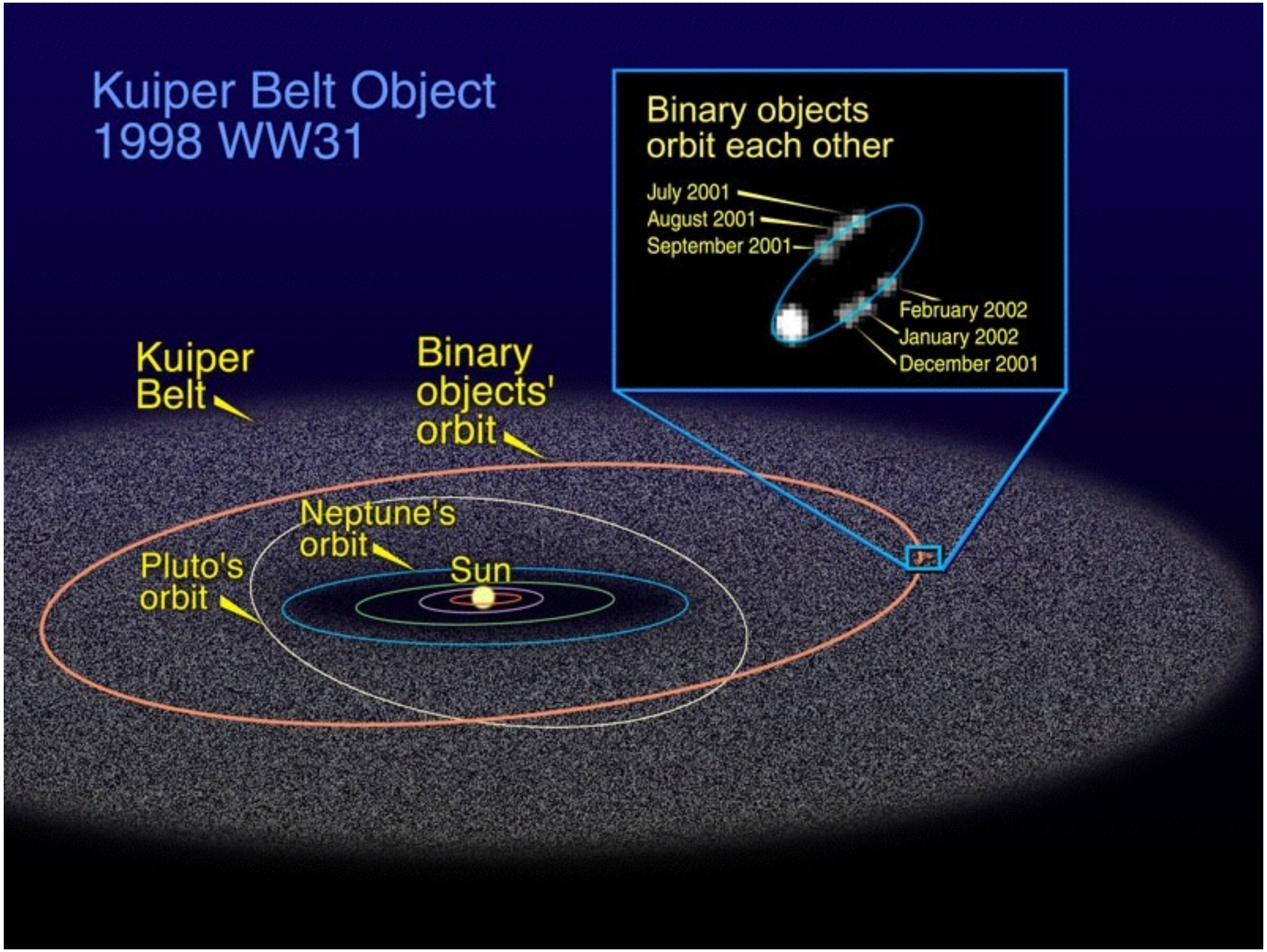
Dwarf Planet Ceres

Ceres is Differentiated

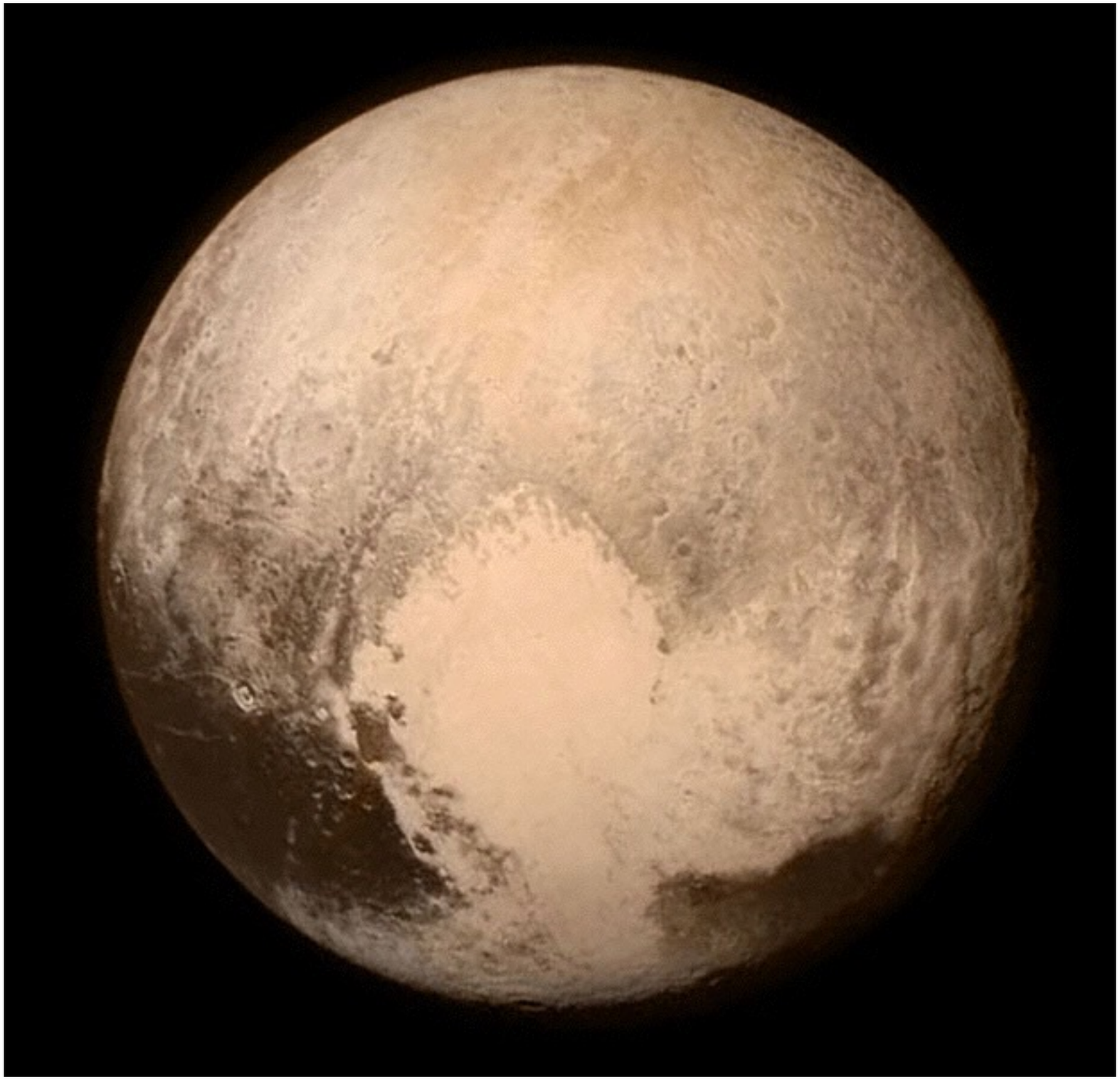


Meteors vs Meteorites

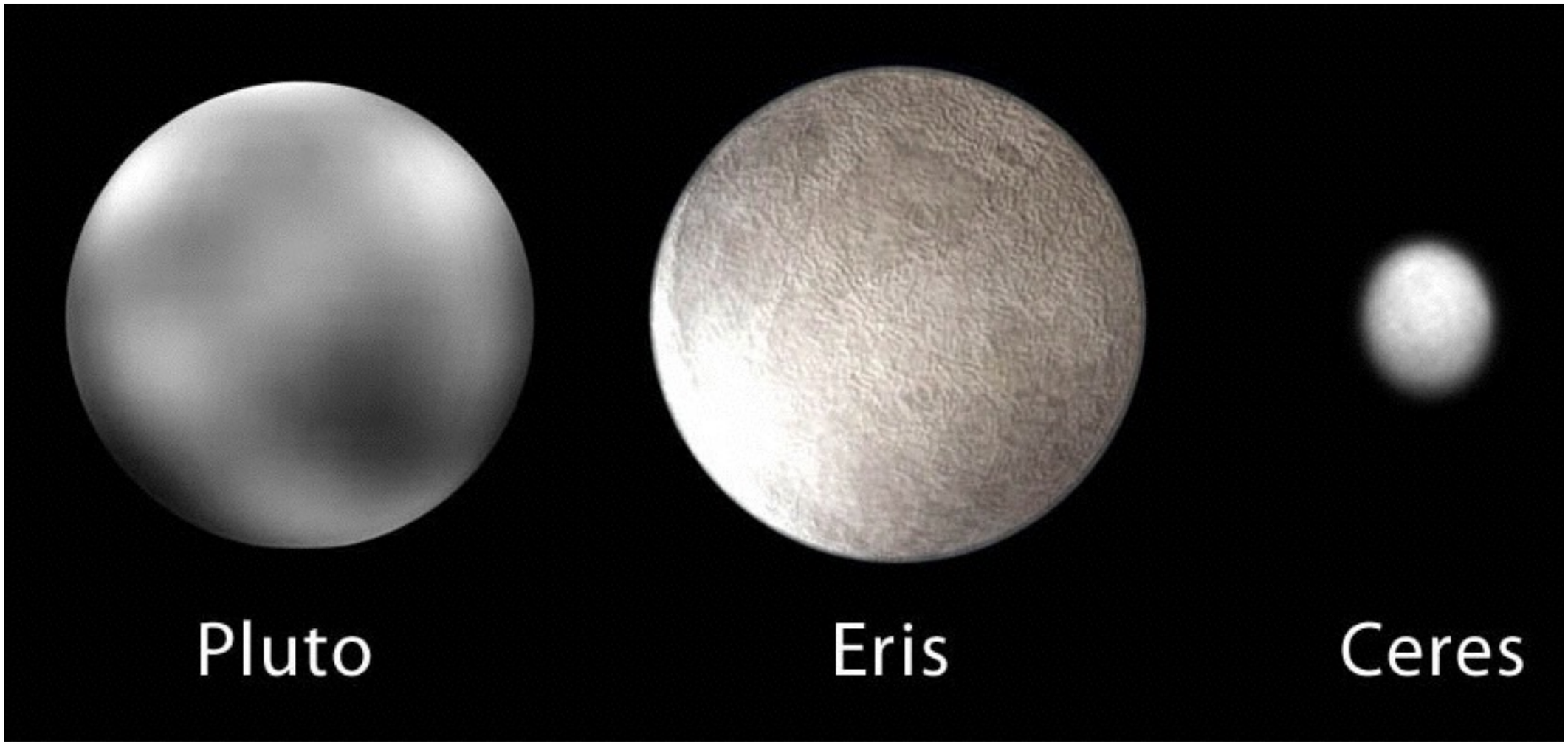
Kuiper Belt


Kuiper Belt Object
1998 WW31
Binary objects
orbit each other
July 2001
August 2001
September 2001
February 2002
January 2002
December 2001
Kuiper
Belt
Binary
objects'
orbit
Neptune's
orbit
Pluto's
orbit
Sun

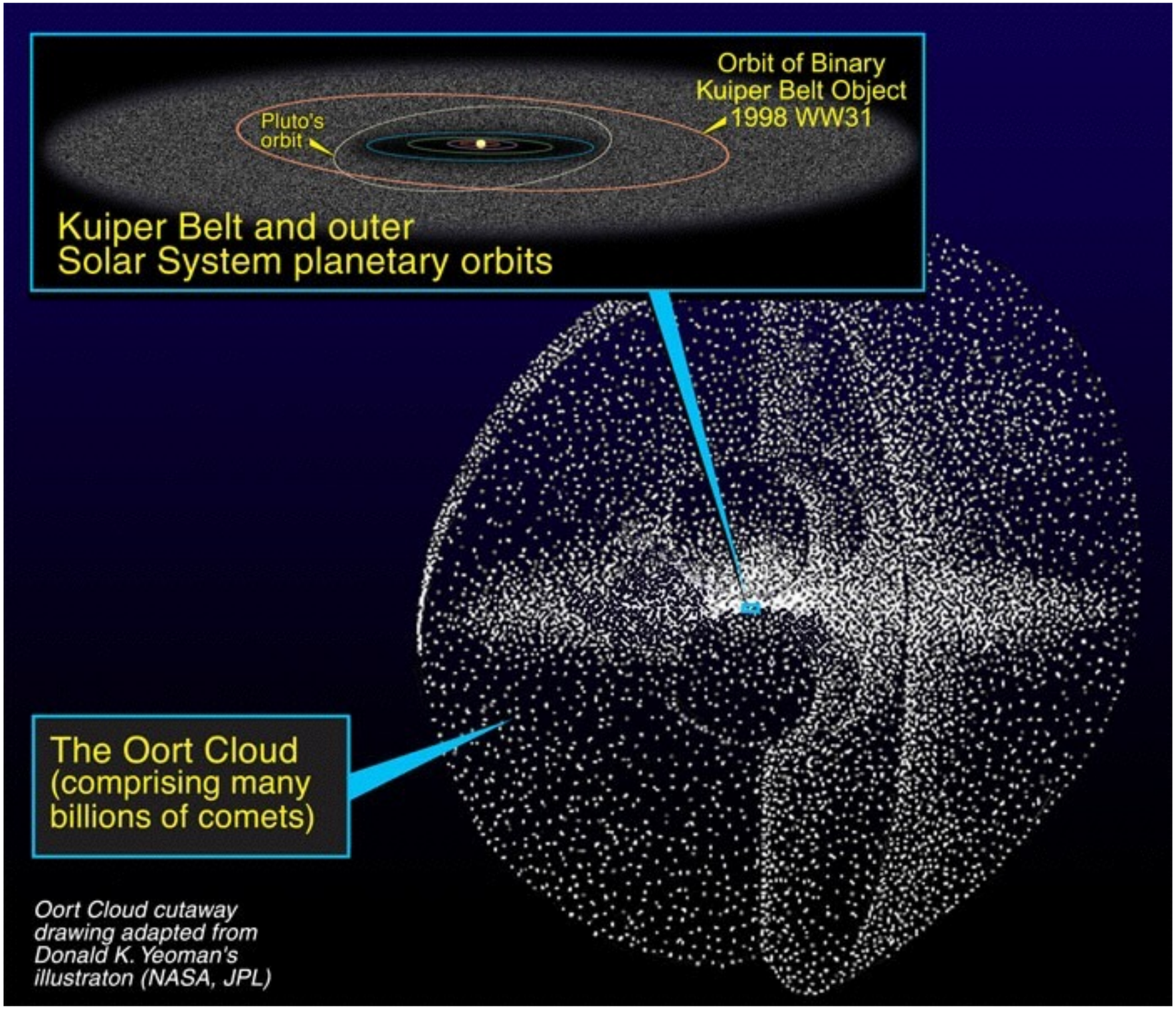
Pluto



Dwarf Planets



The Oort Cloud



Comets