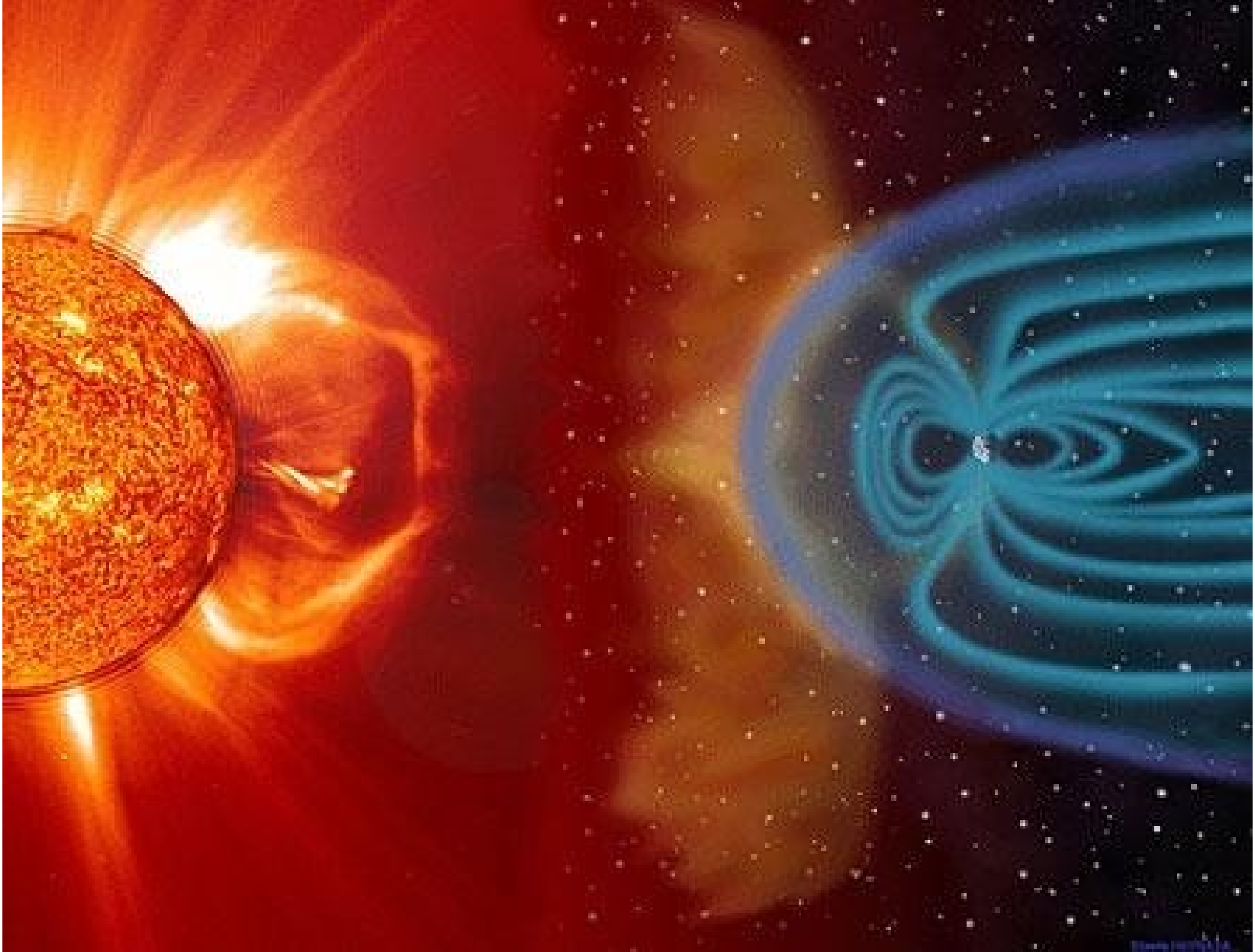
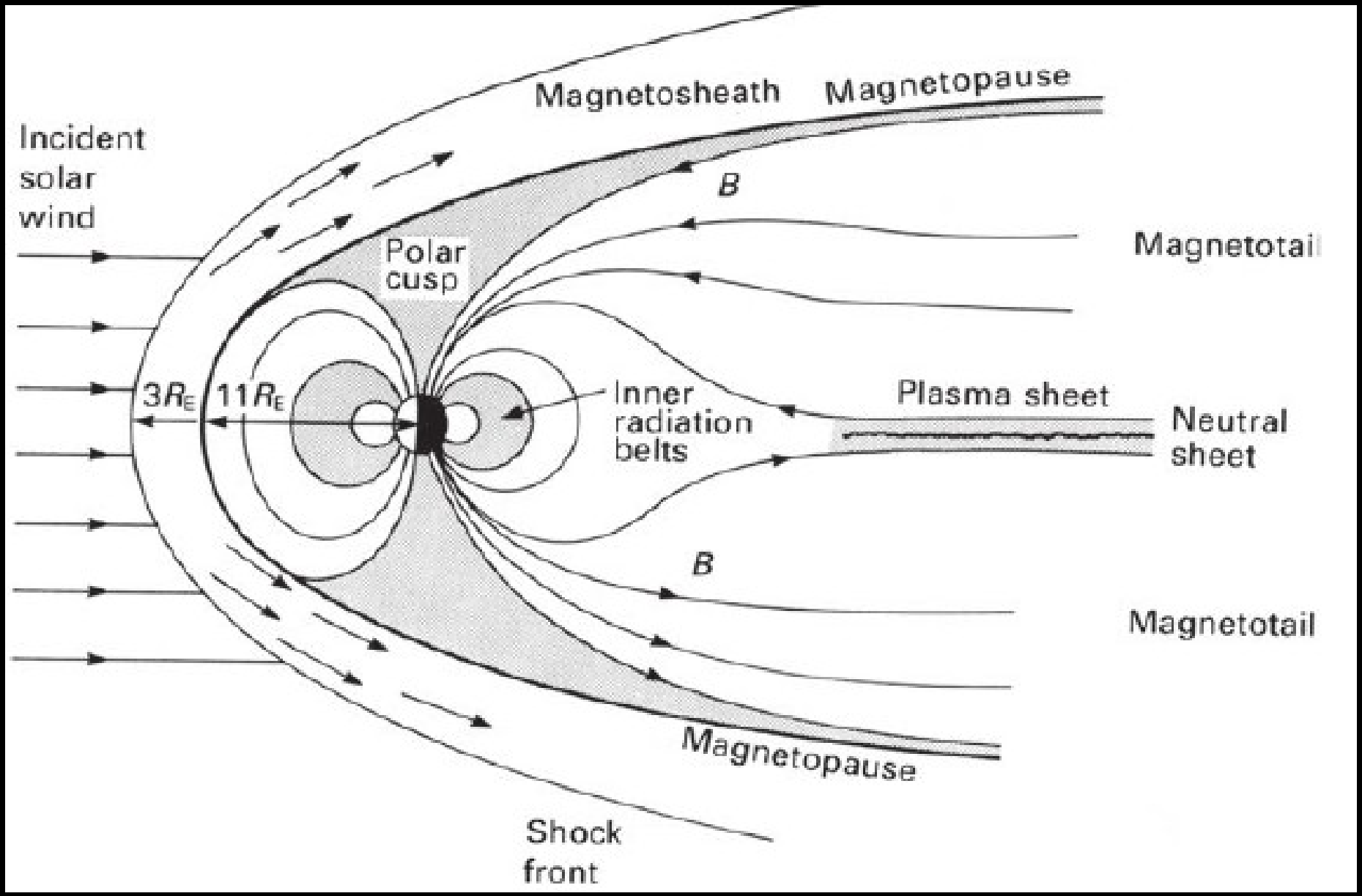
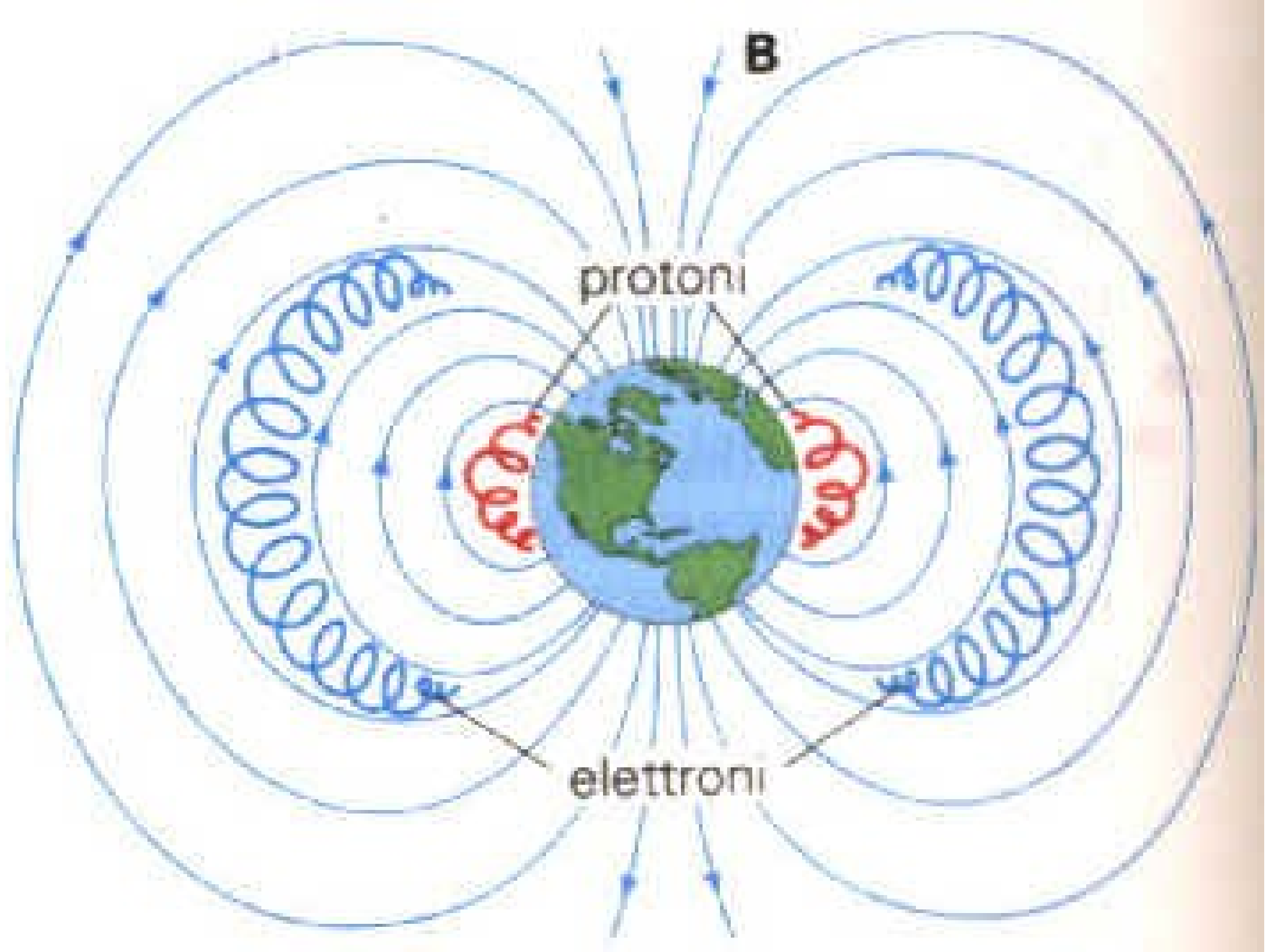
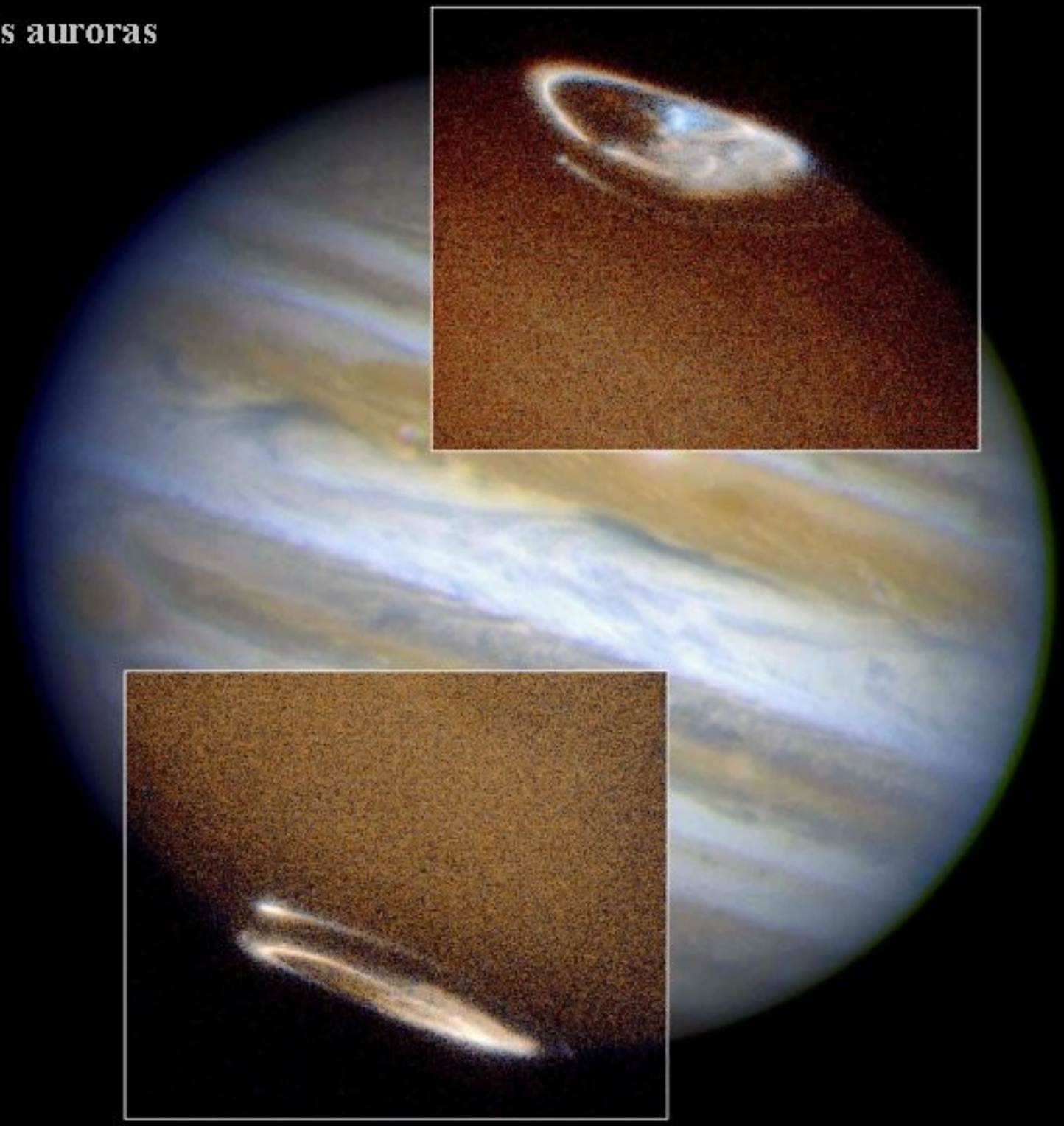
The Solar System

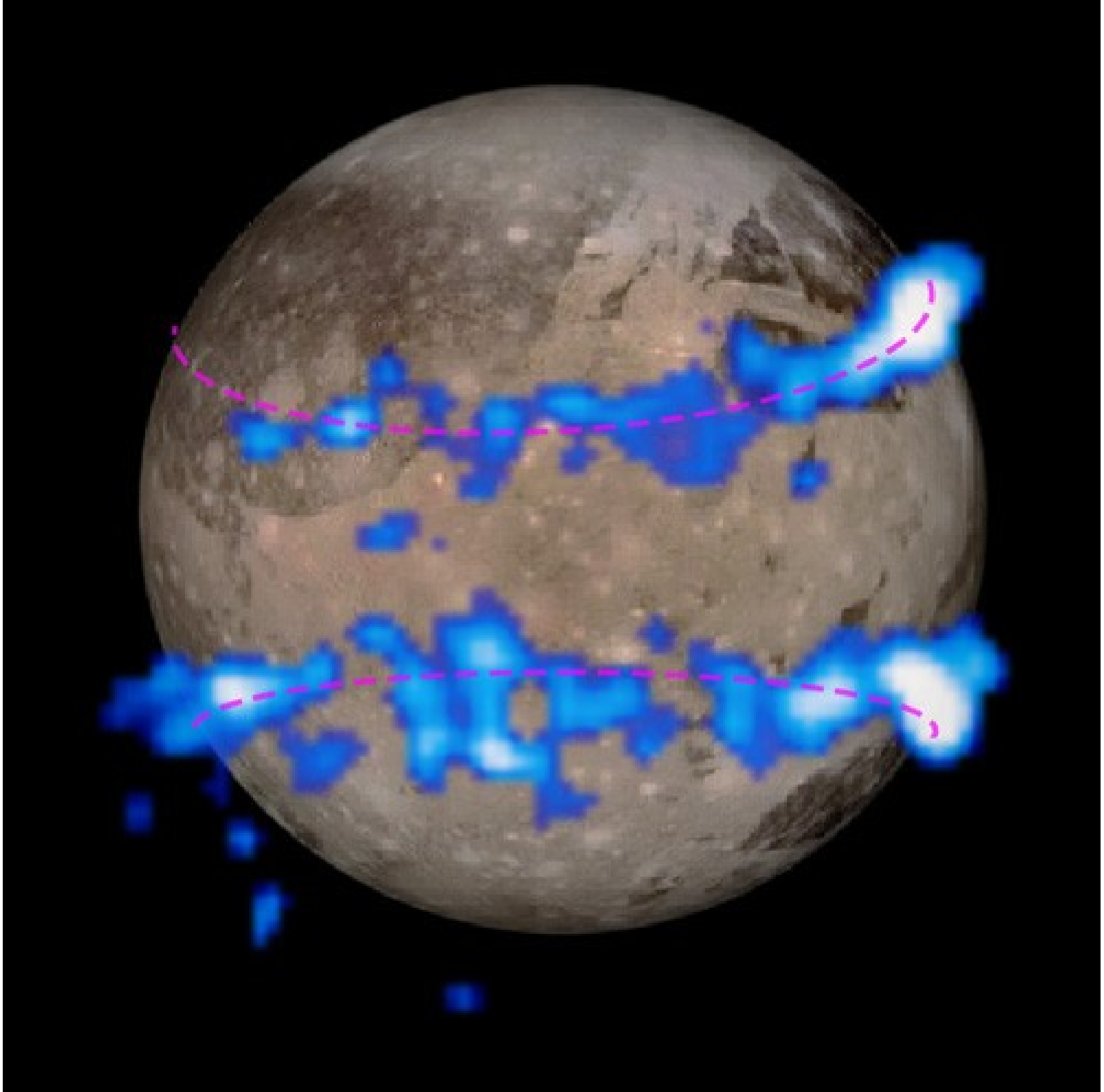



Magnetosheath
Magnetopause
Incident
solar
wind
B
Polar
cusp
Magnetotail
$3R_E$
$11R_E$
Inner
radiation
belts
Plasma sheet
Neutral
sheet
B
Magnetotail
Magnetopause
Shock
front


B
protoni
elettroni

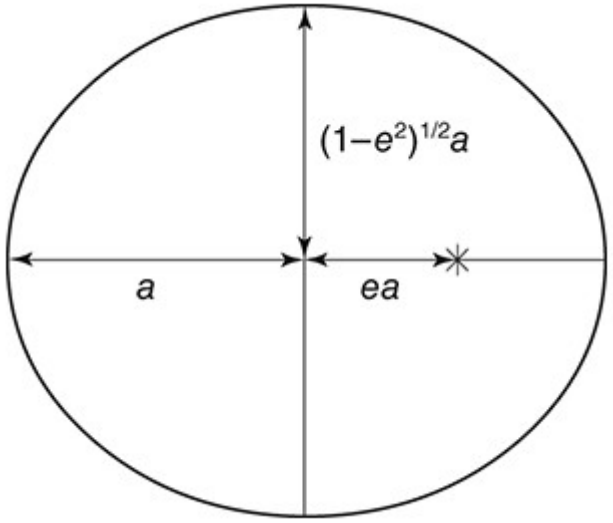
Jupiter's auroras



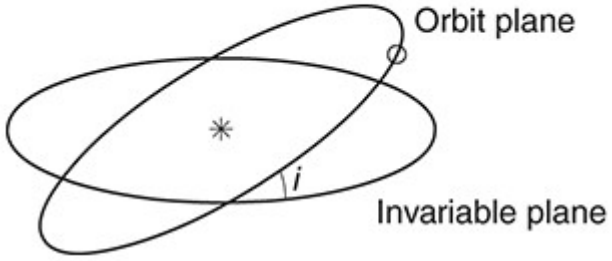


1st Kepler Law

Planetary orbits are elliptical with the sun at a focus.



$$L = \sqrt{1-e^2}\sqrt{GMa} \quad (5.1)$$

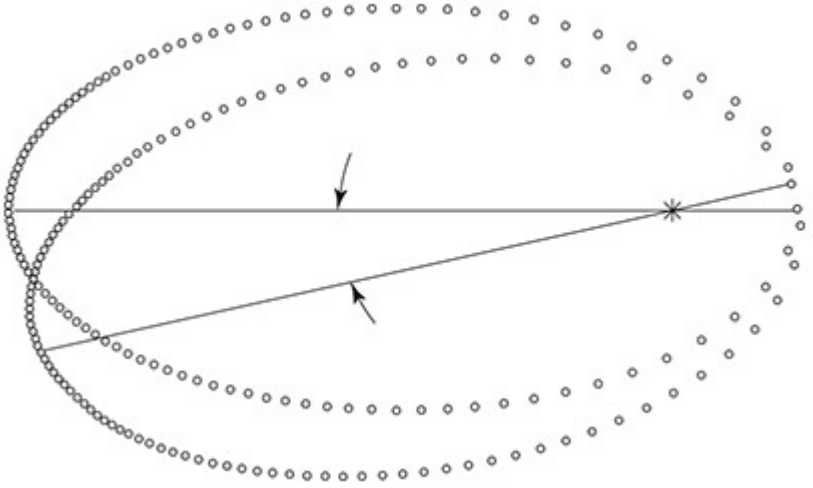


Planet	$M/\mathcal{M}_\oplus$	a/AU	e	i	Period	$P:P_J$
Mercury	0.055	0.387	0.206	6.34	0.241	1:49.2
Venus	0.815	0.723	0.007	2.19	0.615	1:19.3
Earth	1	1	0.017	1.58	1	1:11.9
Mars	0.108	1.524	0.093	1.67	1.881	1:6.31
Jupiter	317.8	5.203	0.049	0.32	11.86	
Saturn	95.15	9.582	0.056	0.93	29.46	2.48:1
Uranus	14.54	19.19	0.047	1.02	84.02	7.08:1
Neptune	17.15	30.07	0.009	0.72	164.8	13.9:1
Pluto	0.002	39.26	0.245	17.1	247.7	20.9:1

2nd Kepler Law

The radius vector from the sun to a planet sweeps equal areas in equal times.

$$T + U = E_{tot}$$



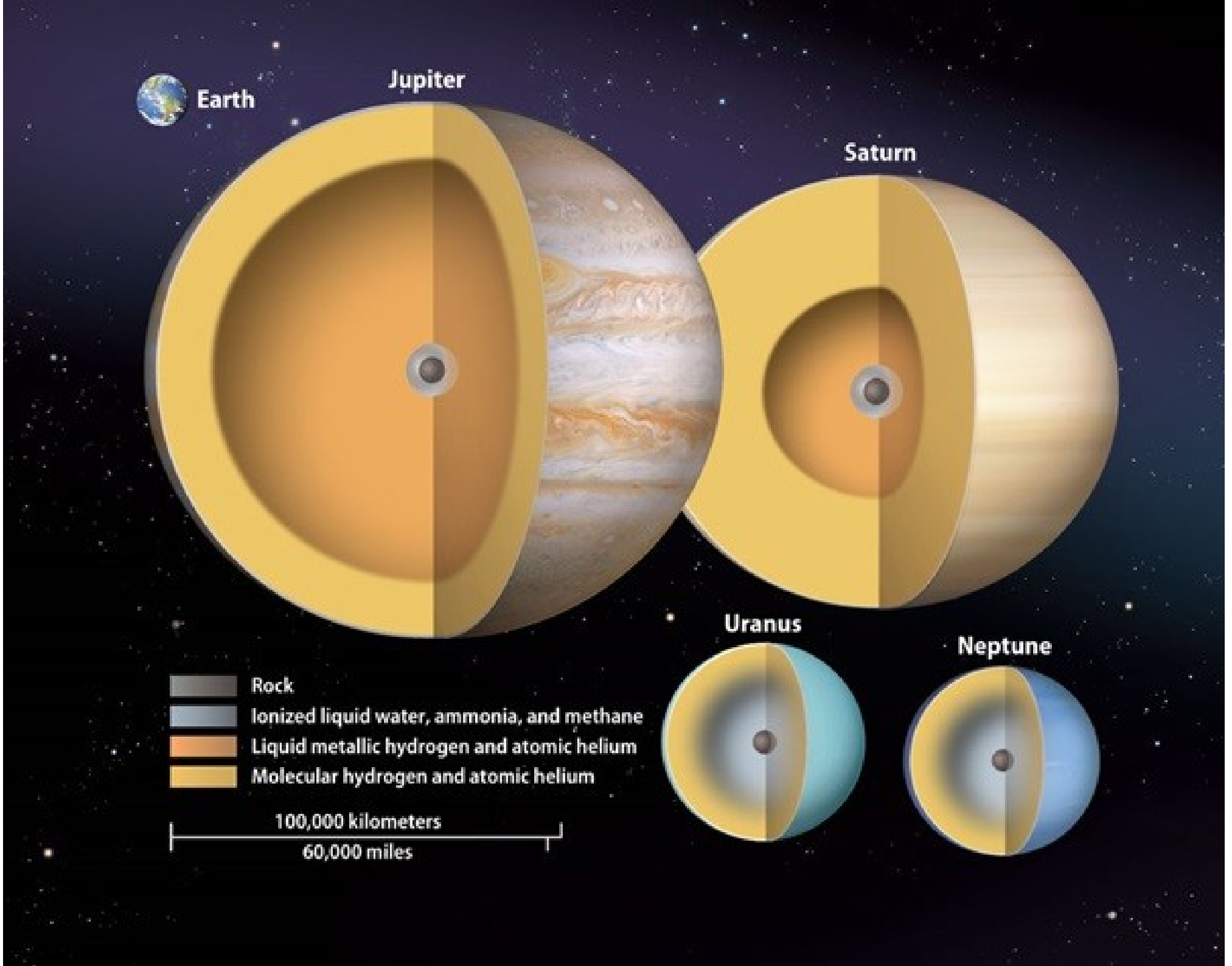
3^{rd} Kepler Law

The ratio of the square of the period of revolution and the cube of the ellipse semimajor axis is the same for all planets.

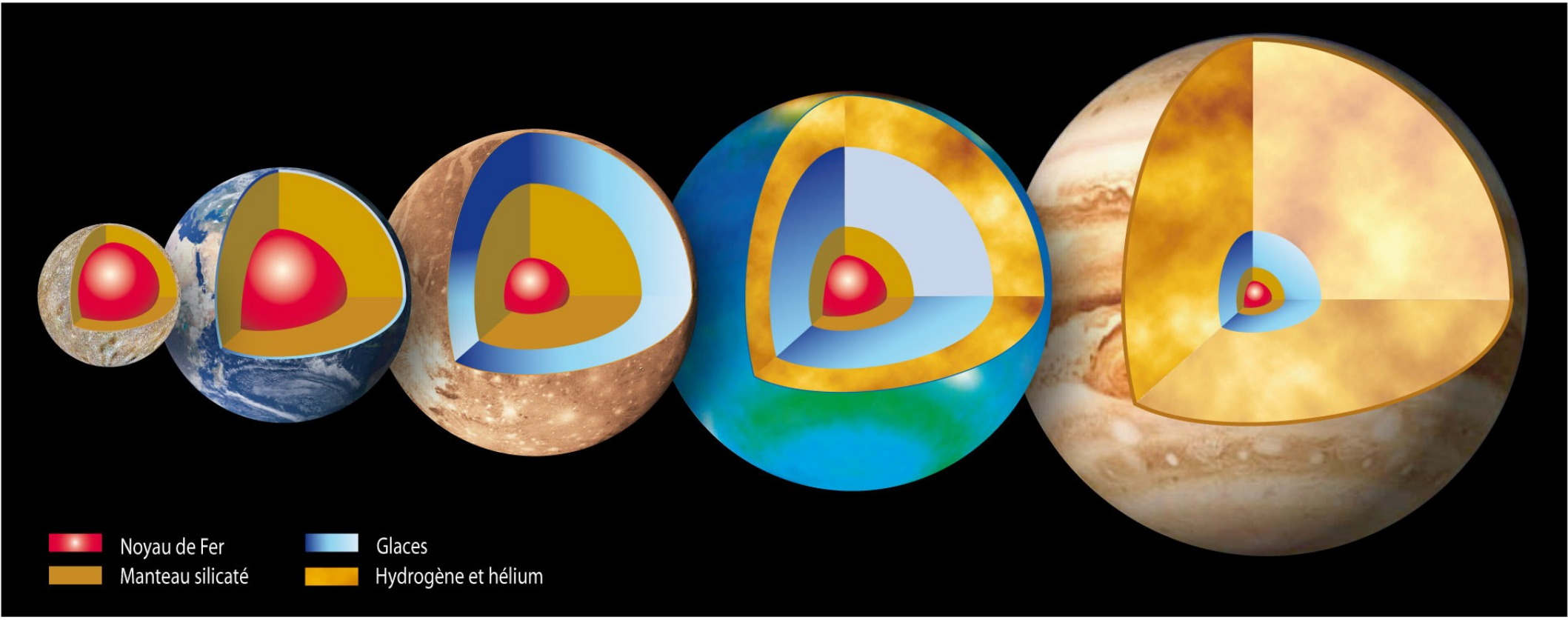
$$\text{Grav. acc.} = G M_{\odot} / R^2$$

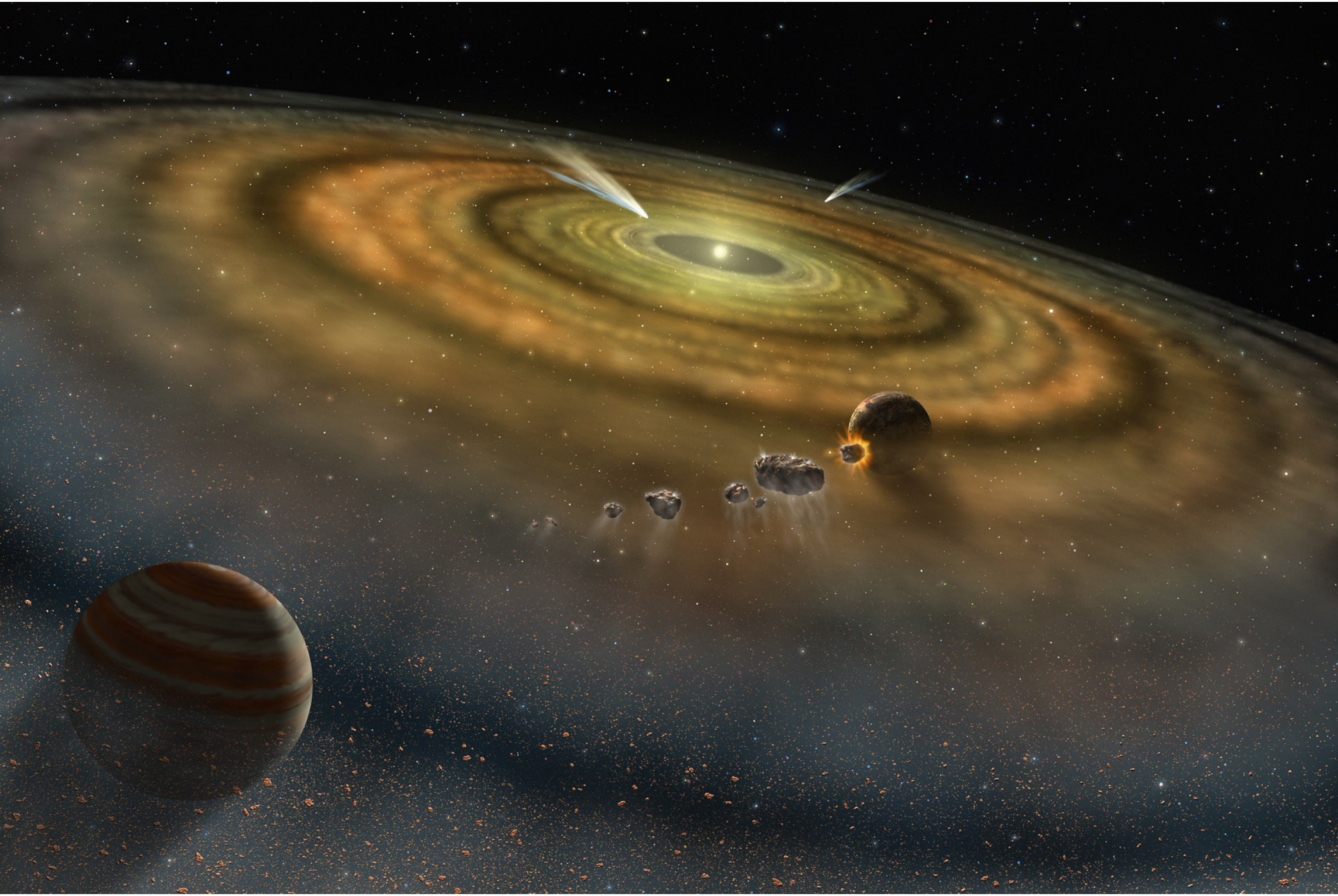
$$\text{Centrip. acc.} = \Omega^2 R$$

$$\Omega^2 R^3 = G M_{\odot}$$

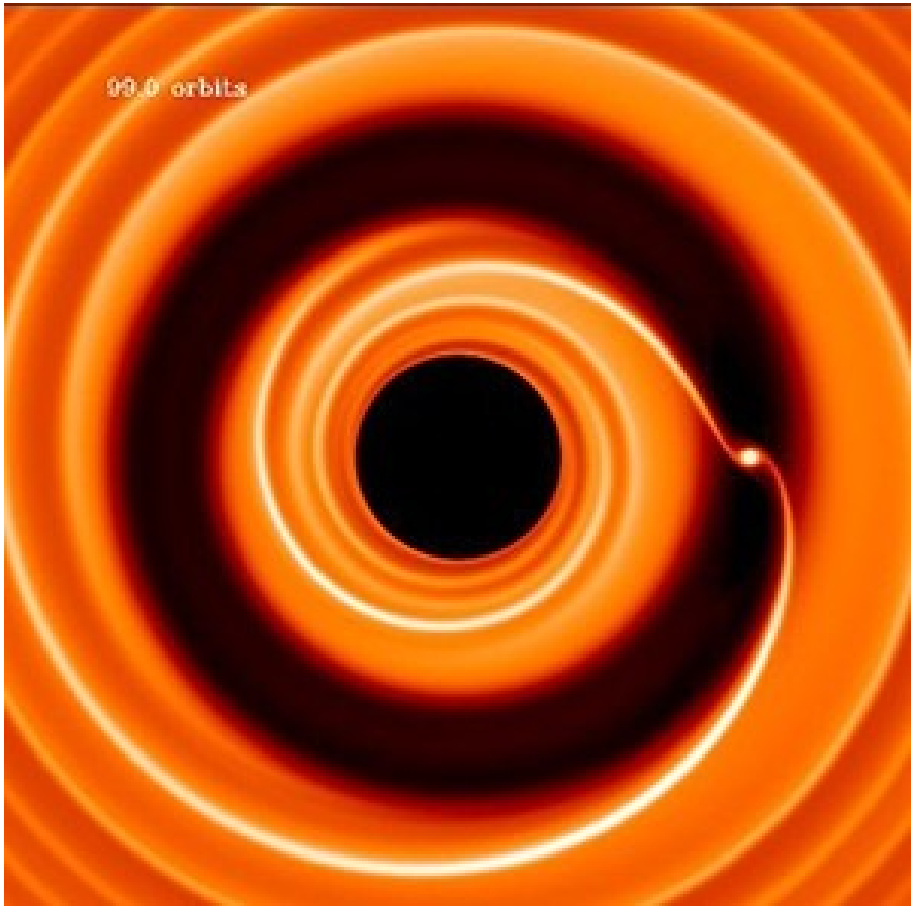

Earth
Jupiter
Saturn
Uranus
Neptune
Rock
Ionized liquid water, ammonia, and methane
Liquid metallic hydrogen and atomic helium
Molecular hydrogen and atomic helium
100,000 kilometers
60,000 miles

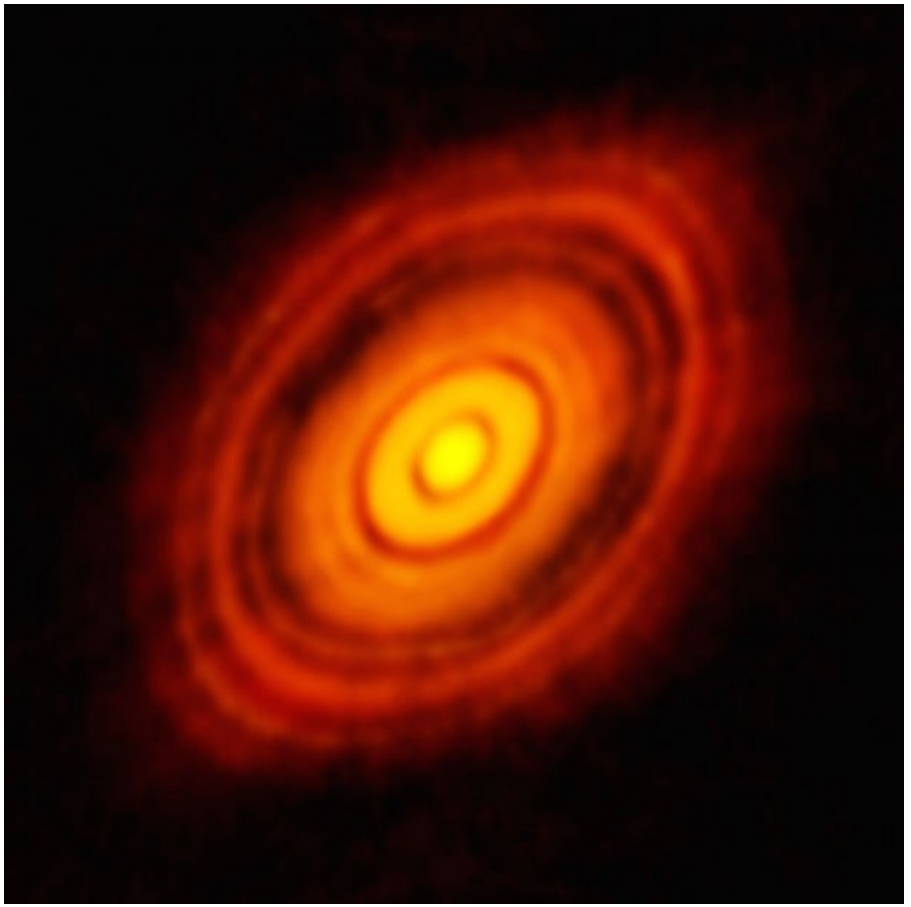

Mars
6804.9 km
Ganymede
5262 km
Titan
5150 km
Mercury
4879.4 km
Callisto
4821 km
Io
3643 km
Moon
3476.2 km
Europa
3122 km
Triton
2706.8 km
Pluto
2390 km
Sedna
~ 1500 km
Titania
1578 km
Rhea
1528 km
Oberon
1523 km
Iapetus
1436 km
Quaoar
1200 km
Charon
1186 km
Umbriel
1169.4 km
Ariel
1158 km
Dione
1118 km
Tethys
1059 km
Earth
12,756.28 km
Diameters of the Terrestrial Bodies
of the Solar System


Noyau de Fer
Manteau silicaté
Glaces
Hydrogène et hélium

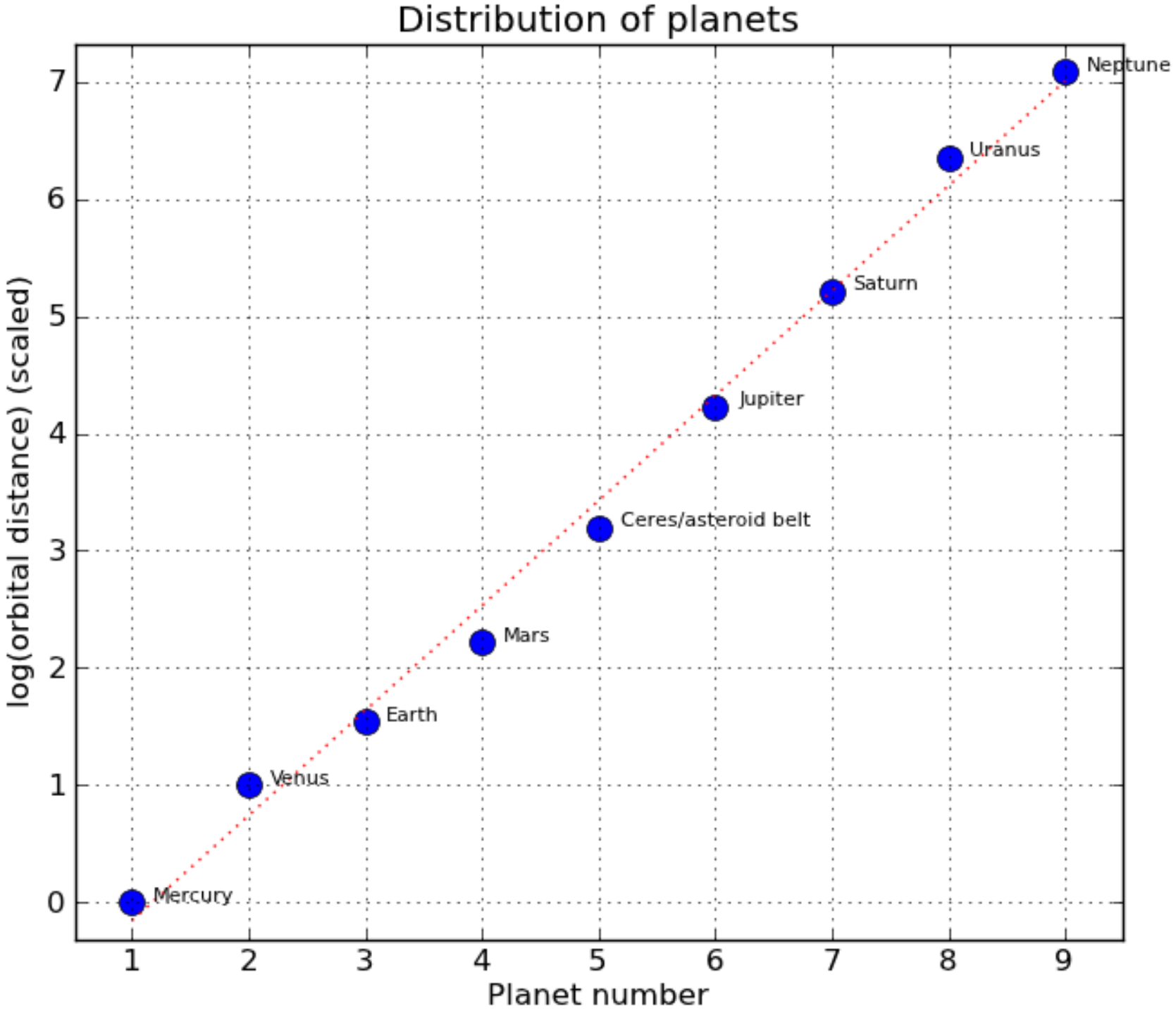


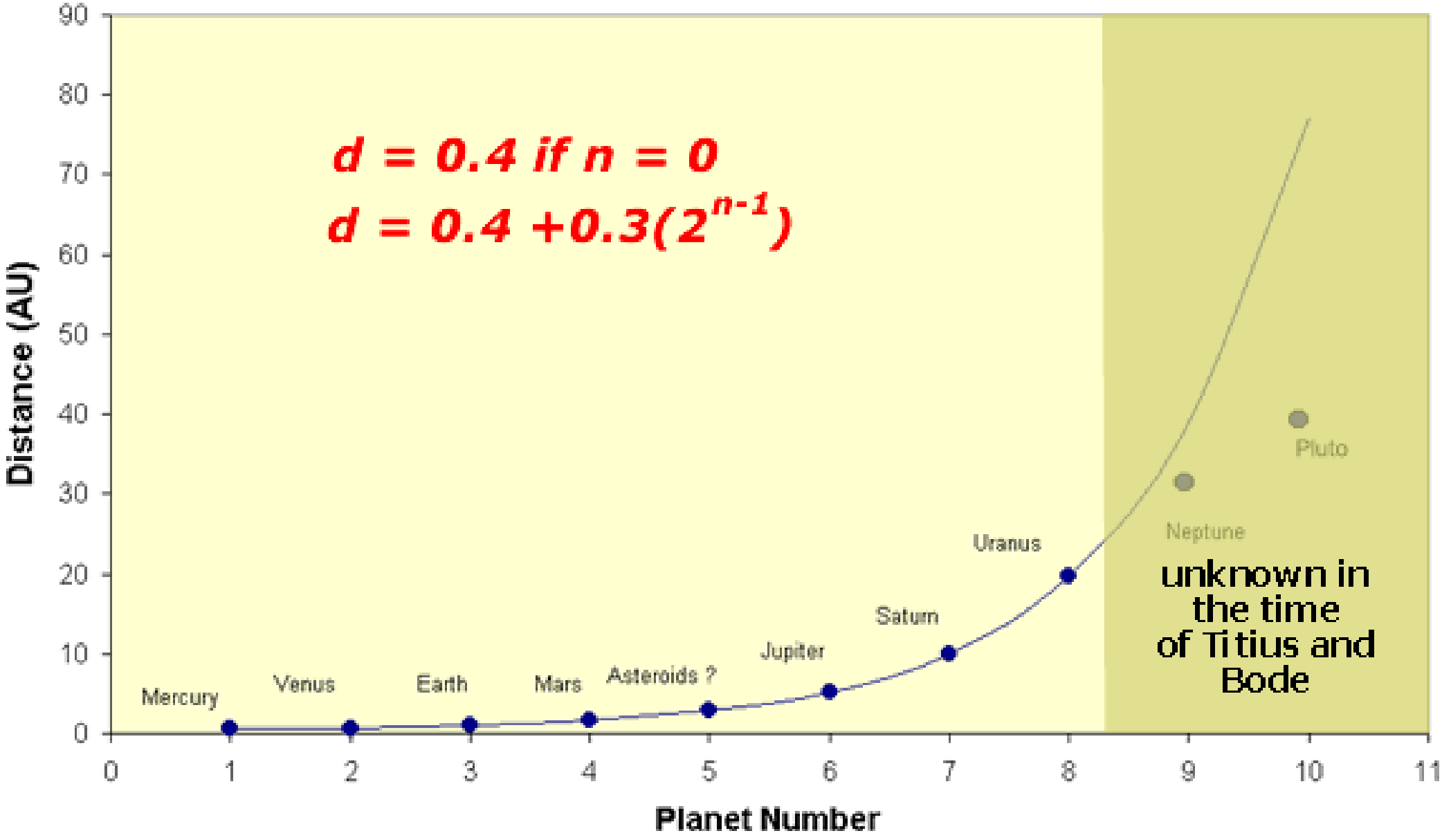
Planenetary disk





A planet (right centre) orbiting an (invisible) central star excites a spiral wave in the surrounding gas disc. Through this wave the planet gets angular momentum from the disc inside its orbit, and looses angular momentum to the exterior portion of the disc. These angular- the planet.


Distribution of planets
log(orbital distance) (scaled)
Planet number
Mercury
Venus
Earth
Mars
Ceres/asteroid belt
Jupiter
Saturn
Uranus
Neptune
0
1
2
3
4
5
6
7
1
2
3
4
5
6
7
8
9


d = 0.4 if n = 0
d = 0.4 +0.3(2^(n-1))
Distance (AU)
Planet Number
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
8
9
10
11
Mercury
Venus
Earth
Mars
Asteroids ?
Jupiter
Saturn
Uranus
Neptune
Pluto
unknown in the time of Titius and Bode