Journal of Astrobiology and Outreach

Dr. Mikhail Igorevich Panasyuk

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Dr. Mikhail Igorevich Panasyuk

Biography

Mikhail Igorevich Panasyuk, born in the year of 1945, graduated from the Department of Physics, M.V. Lomonosov Moscow State University in 1969. In 1972 on completing post-graduate course he started employment with D.V. Skobeltsyn Institute of Nuclear Physics of MSU. In 1991 he became a Chief of Space-Research Department and in 1992 he was elected as a Director of the Institute. M. Panasyuk is a specialist in the field of experimental studies of cosmic rays and solar-terrestrial physics, an author of over 350 scientific publications.Initially the scientific research of M. Panasyuk concerned physics of the Earths radiation belts of the Earth. M. Panasyuk leads an active educational work. Since 1993 he is a Professor of the Department of Physics of MSU.

Research Interests

Fundamental and applied studies within the field of space physics, astrophysics of cosmic rays, high-energy physics, nuclear physics, interaction of radiation with matter, studies of nanostructures, information technologies development.

Recent Publications

1. Ultraviolet flashes in the equatorial region of the earth, GK Garipov, MI **Panasyuk**, VI Tulupov… - Journal of Experimental,2005 - Springer

2. Academician DV Skobel'tsyn as the founder of the MSU school of nuclear physics, MI **Panasyuk**, EA Romanovskii - Physics-Uspekhi, 2013 - ufn.ru

3. The planetary distribution of auroras, MI **Panasyuk**, EA Romanovskii, VI Tulupov - Herald of the Russian, 2013 - Springer

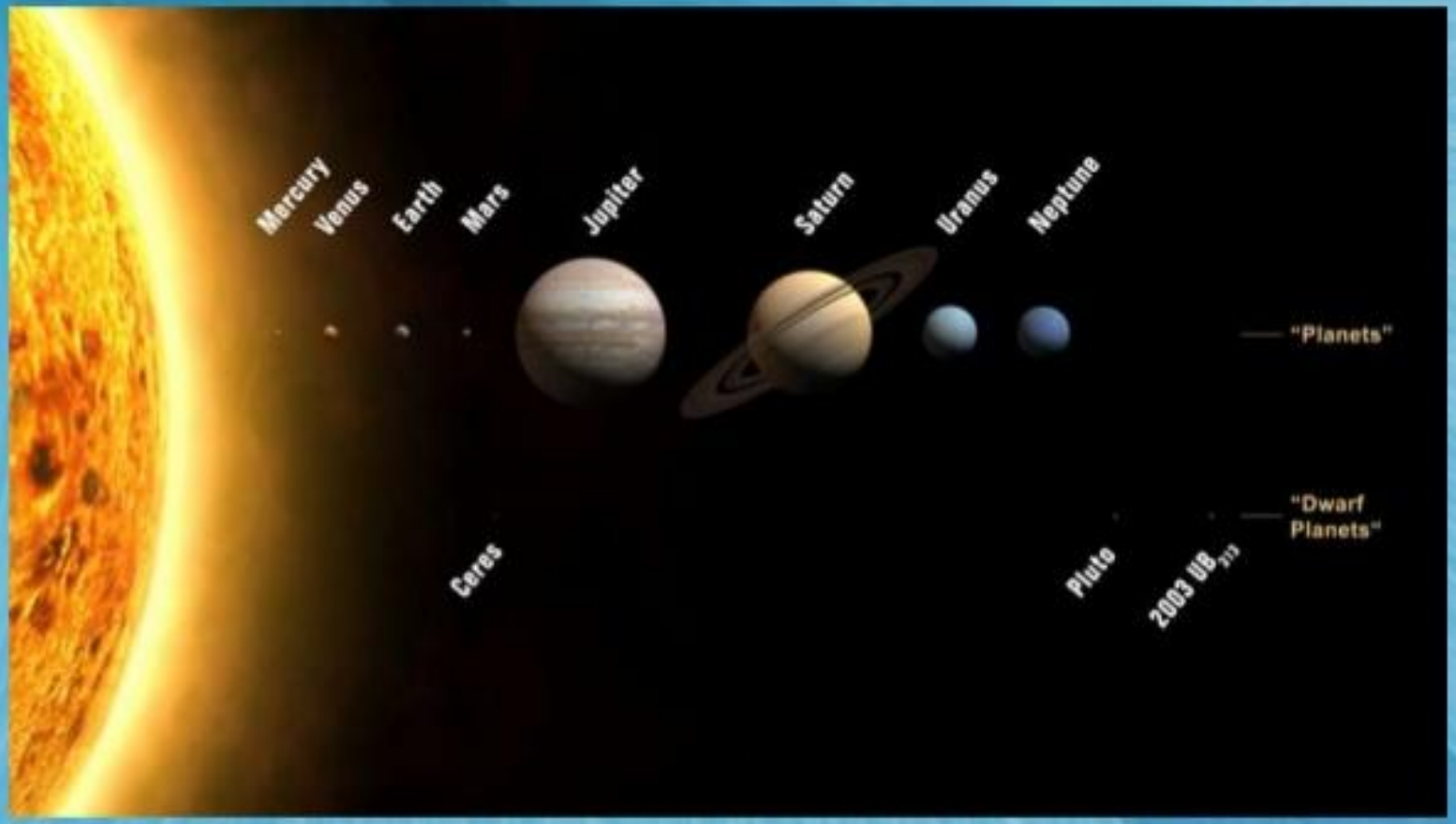
4. SN Vernov and space physics: Apatity-Leningrad, 1968-1983, VA Dergachev - Physics-Uspekhi, 2011 - turpion.org

5. Coming of age and development of space physics at Moscow State University. Radiation in space: the legacy of SN Vernov, MI **Panasyuk** - Physics-Uspekhi, 2011 - turpion.org

- **Astrophysics** (from Greek *astron*, ἄστρον "star", and *physis*, φύσις "nature") is the branch of astronomy that deals with the physics of the universe, especially with "the nature of the heavenly bodies, rather than their positions or motions in space.
- Among the objects studied are galaxies, stars, planets, extra solar planets, the interstellar medium and the cosmic microwave background.
- Their emissions are examined across all parts of the electromagnetic spectrum, and the properties examined include luminosity, density, temperature, and chemical composition.
- Because astrophysics is a very broad subject, astrophysicists typically apply many disciplines of physics, including mechanics, electromagnetism, statistical mechanics,thermodynamics, quantum mechanics, relativity, nuclear and particle physics, and atomic and molecular physics.

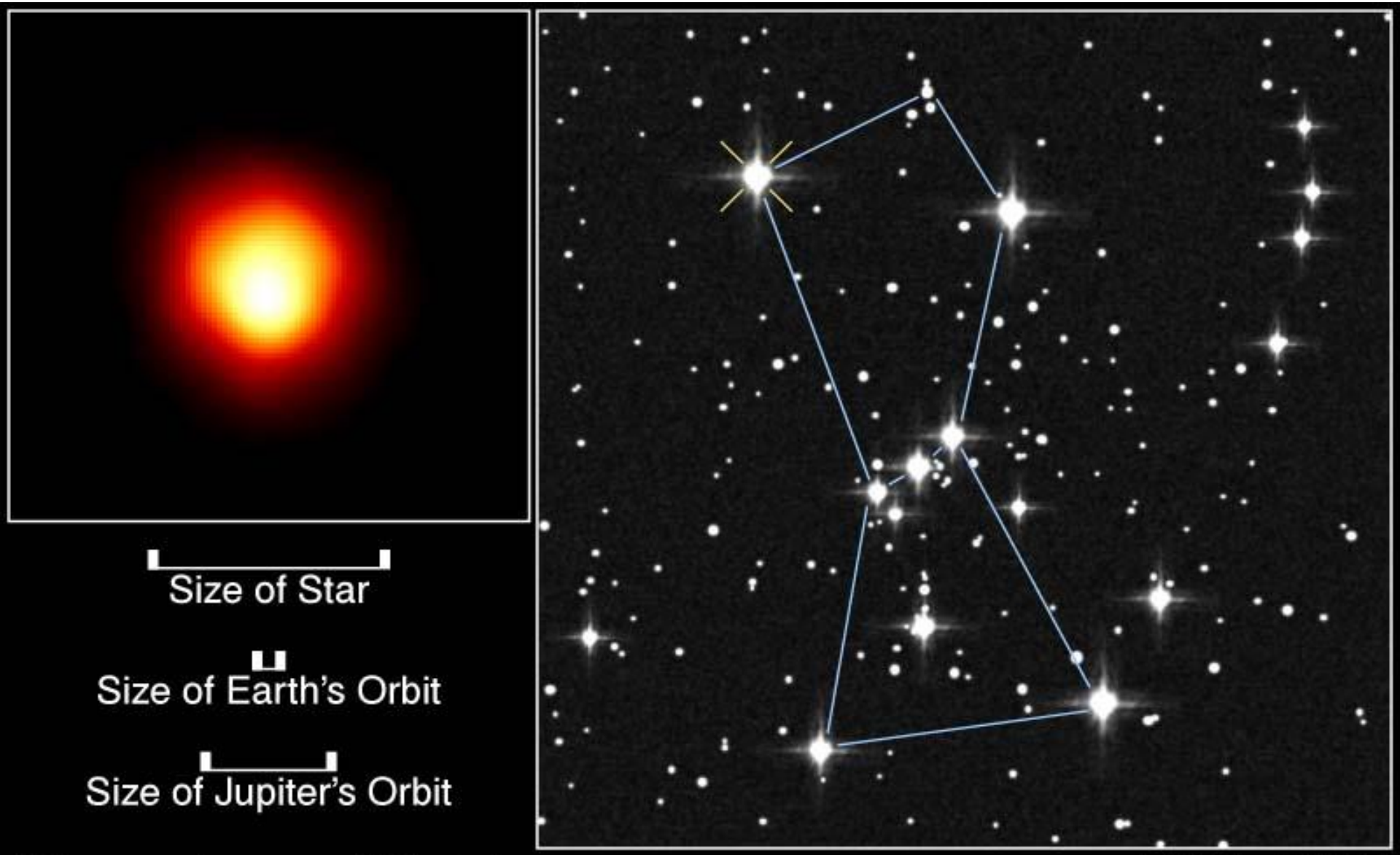


The Solar System



You need to know the names of the planets

Stellar Sizes

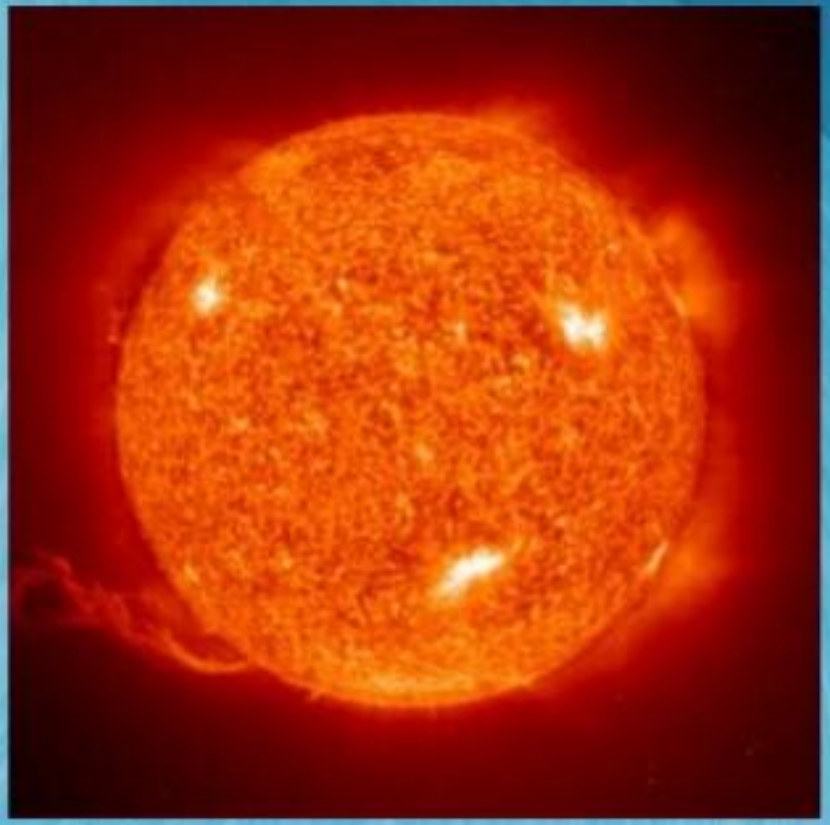


Planets orbit in ellipses

- An ellipse is a "flattened circle" with two foci about which the planet orbits.

- Moons orbit the planets in much the same way.

The Sun



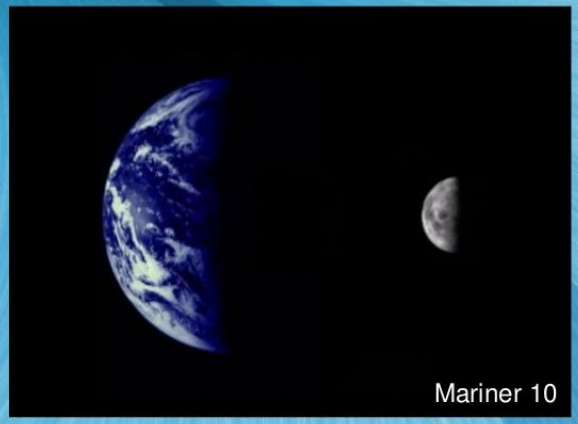
- Mass: 1.99×10^{30} kg
- Radius: 6.96×10^{8} m
- Surface temperature: 5800 K

Planets Data

Planet	Picture	Distance to the Sun (km)	Diameter(km)	Orbital period around its axis	Orbital period	Surface day temp (°C)	Density (water=1)	Satellites
Mercury		58 million	4 878 km	59 days	88 days	167	5,43	0
Venus		108 million	12 104 km	-243 days	225 days	464	5,24	0
Earth		149,6 million	12 756 km	23, 93 h	365,2 days	15	5,52	1
Mars		228 million	6 794 km	24h 37min	687 days	-65	3,04	2
Jupiter		778 million	142 800 km	9h 50min 30s	12 years	-110	1,32	+63
Saturn		1 427 million	120 000 km	10h 14min	29,5 years	-140	0,69	+56
Uranus		2 870 million	51 800 km	16h 18min	84 years	-195	1,27	27
Neptune		4 497 million	49 500 km	15h 48min	164 years	-200	1,77	13
Pluto		5 900 million	2 400 km	6 days	248 years	-225	2	1

Mercury and Venus

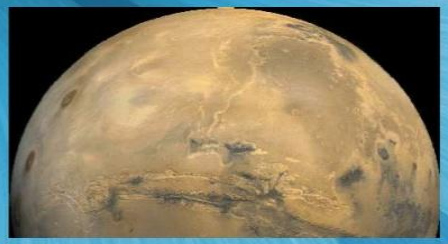
Earth and Moon



Mariner 10

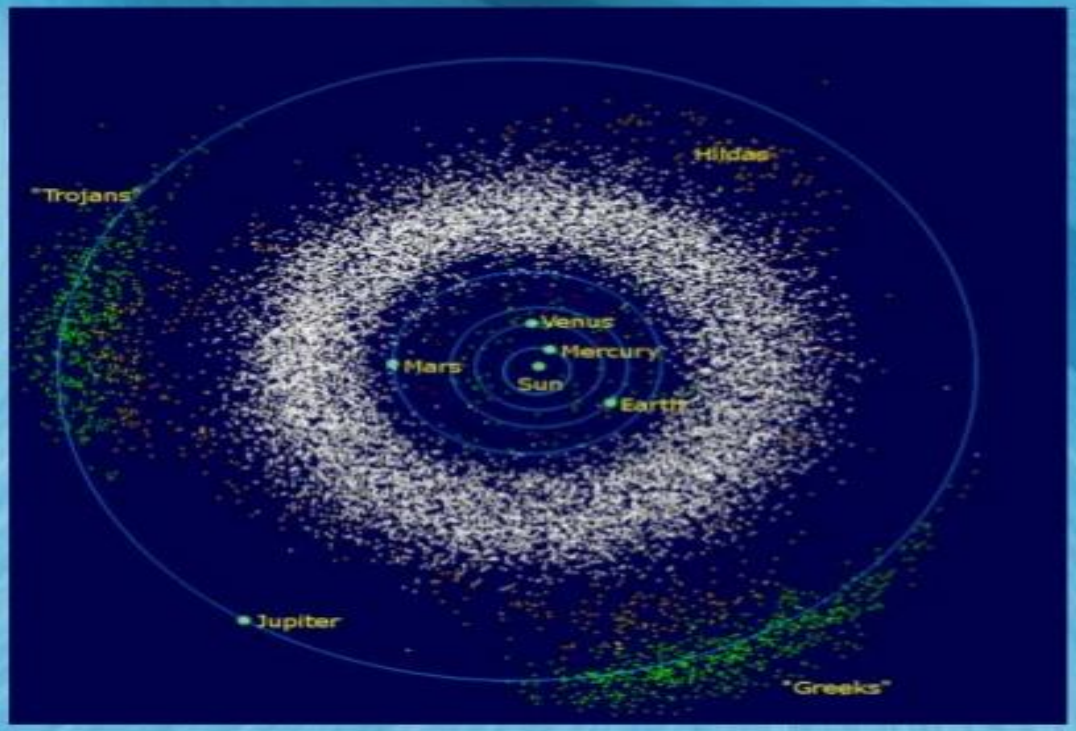
Earth and Moon

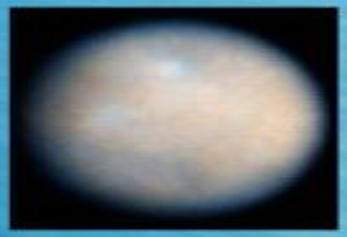
Mars



Spirit Rover: Mars' West Valley

Asteroid Belt





Ceres (480km): it was the first asteroid to be seen. Now it's a dwarf planet.

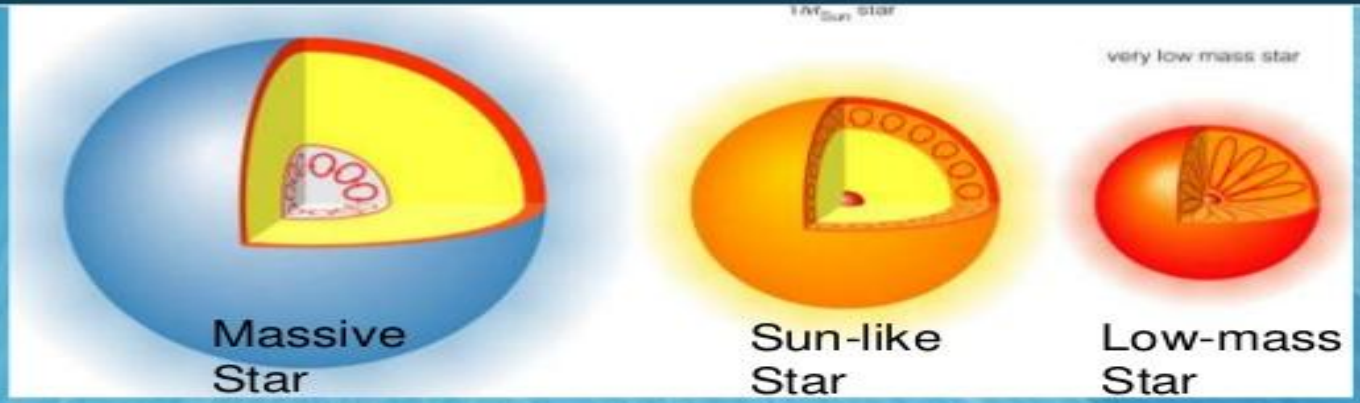
Mathilde (52km)

Eros (13x13x33km)

How far is the asteroid belt?

It is 2 – 3.5 AU. An AU is the astronomical unit, the mean distance from the Earth to the Sun Distance = 2 * 1.496 x 108 km = 293200000000 m from the sun.

A star is a big ball of gas, with fusion going on at its center, held together by gravity!



There are variations between stars, but by and large they're really pretty simple things.

- The most important thing about a star is MASS!
- The mass of a normal star almost completely determines its LUMINOSITY & TEMPERATURE!
- The LUMINOSITY of a star is the TOTAL ENERGY emitted per time from the surface of the star. This light bulb has a luminosity of 60 Watts The energy the Sun emits is generated by the fusion in its core…

- COMETS: are frozen balls of ice and dust that can resemble a "dirty snowball".They orbit the Sun is highly elliptical orbits. Their orbital periods can range from a few years to several thousand years. *Halleys Comet* is famous due to the fact that everyone has a chance to see it in their lifetime (Orbital Period of 77 years).
- Light Year (ly): is the distance that light travels in one year.

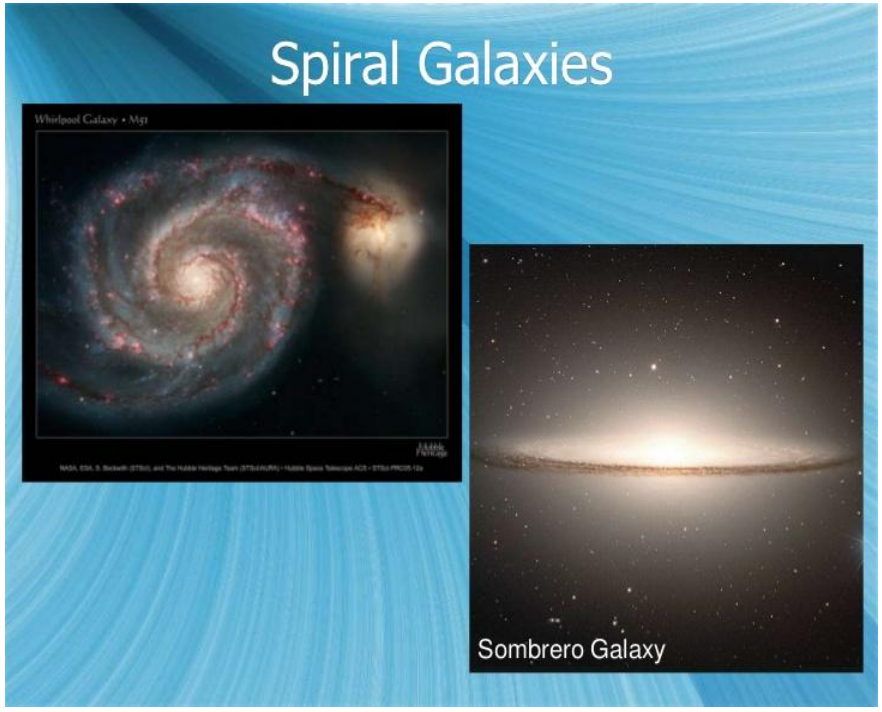
  One light year equals 9.46 x 1015 metres.

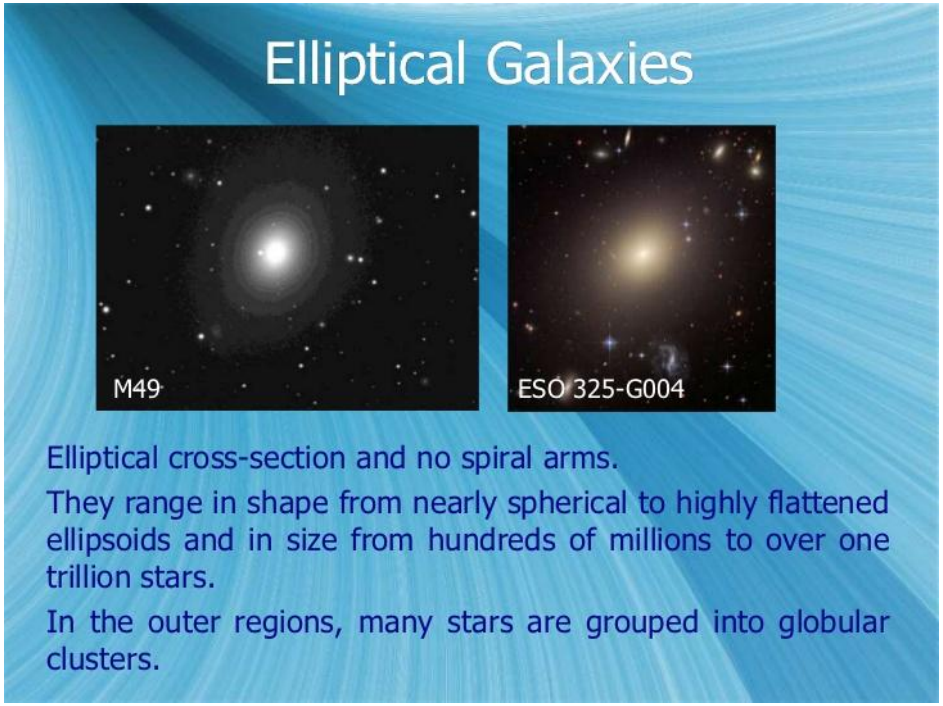
  c = distance/time

  300000000 = distance/365x24x60x60
- Stellar cluster: A number of stars that are held together in a group by a gravitational attraction.They were created at about the same time. There may be many thousands of stars in a group.

Galaxies

- A galaxy is a collection of a very large number of starsmutually attracting each other through the gravitational forceand staying together. The number of stars varies between afew million and hundreds of billions. There approximately100 billion galaxies in the observable universe.
- There are three types of galaxies: -
  - Spiral (Milky Way)
  - Elliptical (M49)
  - Irregular (Magellanic Clouds)

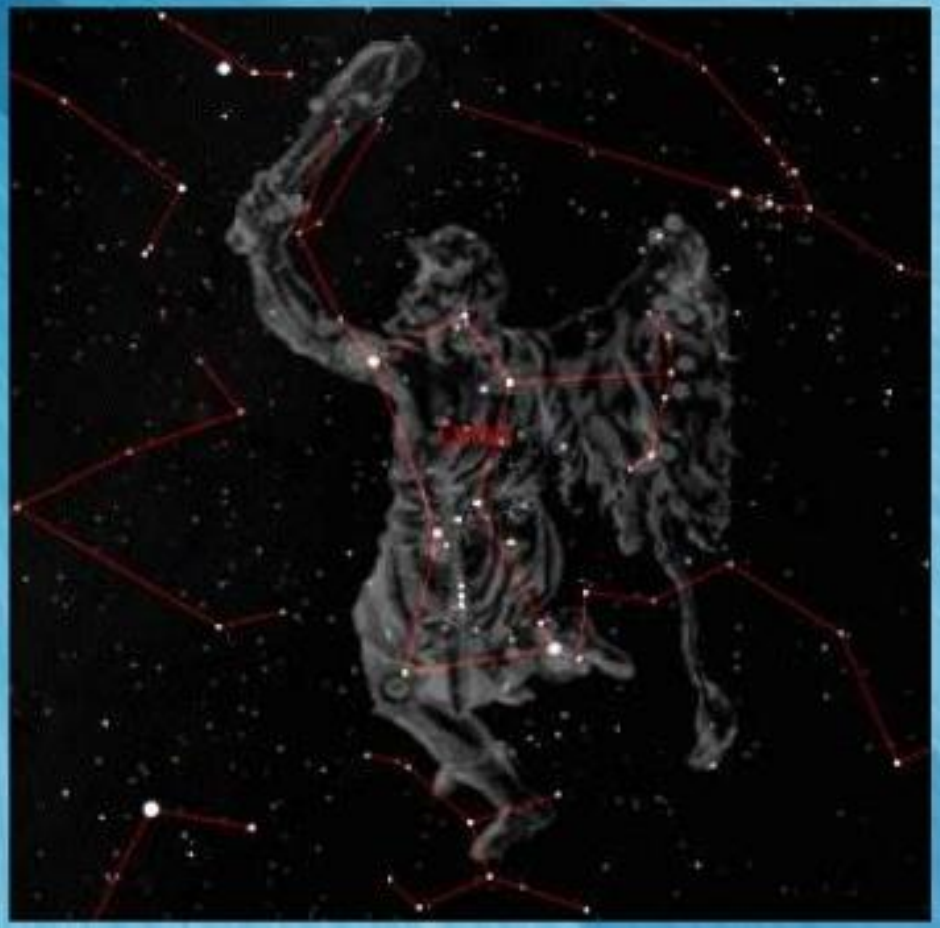




Constellations

A group of stars in a recognizable pattern that *appear* to be near each other in space.

Orion



Nebulae

Nebula is an interstellar cloud of dust, hydrogen gas and plasma. It is the first stage of a star's cycle but it can also refer to the remains of a dying star (planetary nebula).

Originally nebula was a general name for any extended astronomical object, including galaxies beyond the Milky Way (some examples of the older usage survive; for example, the Andromeda Galaxy was referred to as the Andromeda Nebula before galaxies were discovered by Edwin Hubble).

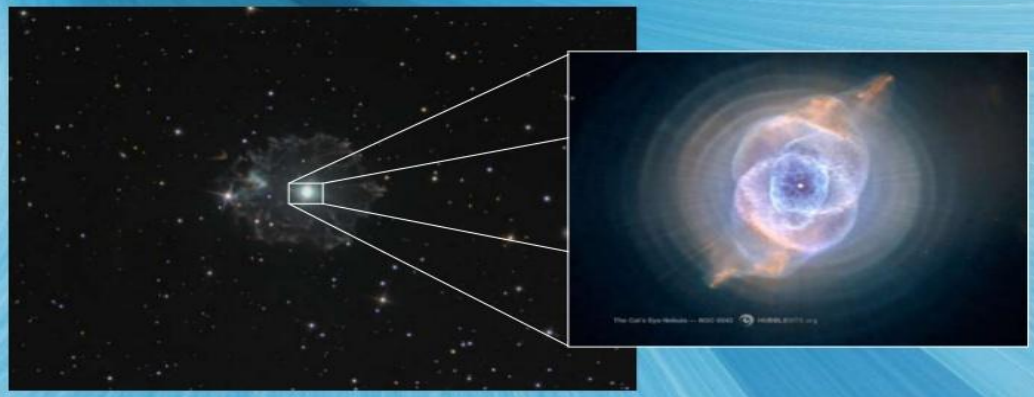
Nebulae often form star-forming regions, such as in the Eagle Nebula.

Nebulae

Eagle Nebula and the Cone nebula:

star-forming regions

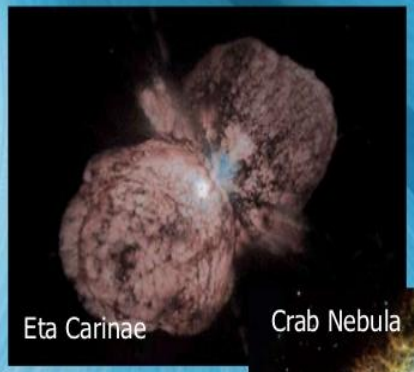
Cat's Eye Nebula

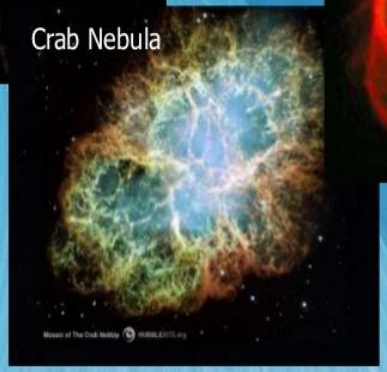


Planetary nebulae are nebulae that form from the gaseous shells that are ejected from low-mass giant stars when they transform into white dwarfs.

Eskimo nebula

Supernovas





Locating Information

- NASA's Astrophysics Data System (ADS): http://adswww.harvard.edu/ and particularly http://adsabs.harvard.edu/abstract_service.html
- SIMBAD: http://simbad.harvard.edu/simbad/ and http://simbad.u-strasbg.fr/simbad/ (there are 2 sites)
- NOTE: VIRTUALLY ALL ELECTRONIC CATALOGS TODAY SEARCH SIMBAD FOR RESOLVING STAR NAMES AND GETTING THEIR COORDINATES. If SIMBAD is down, you may be out of luck!

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