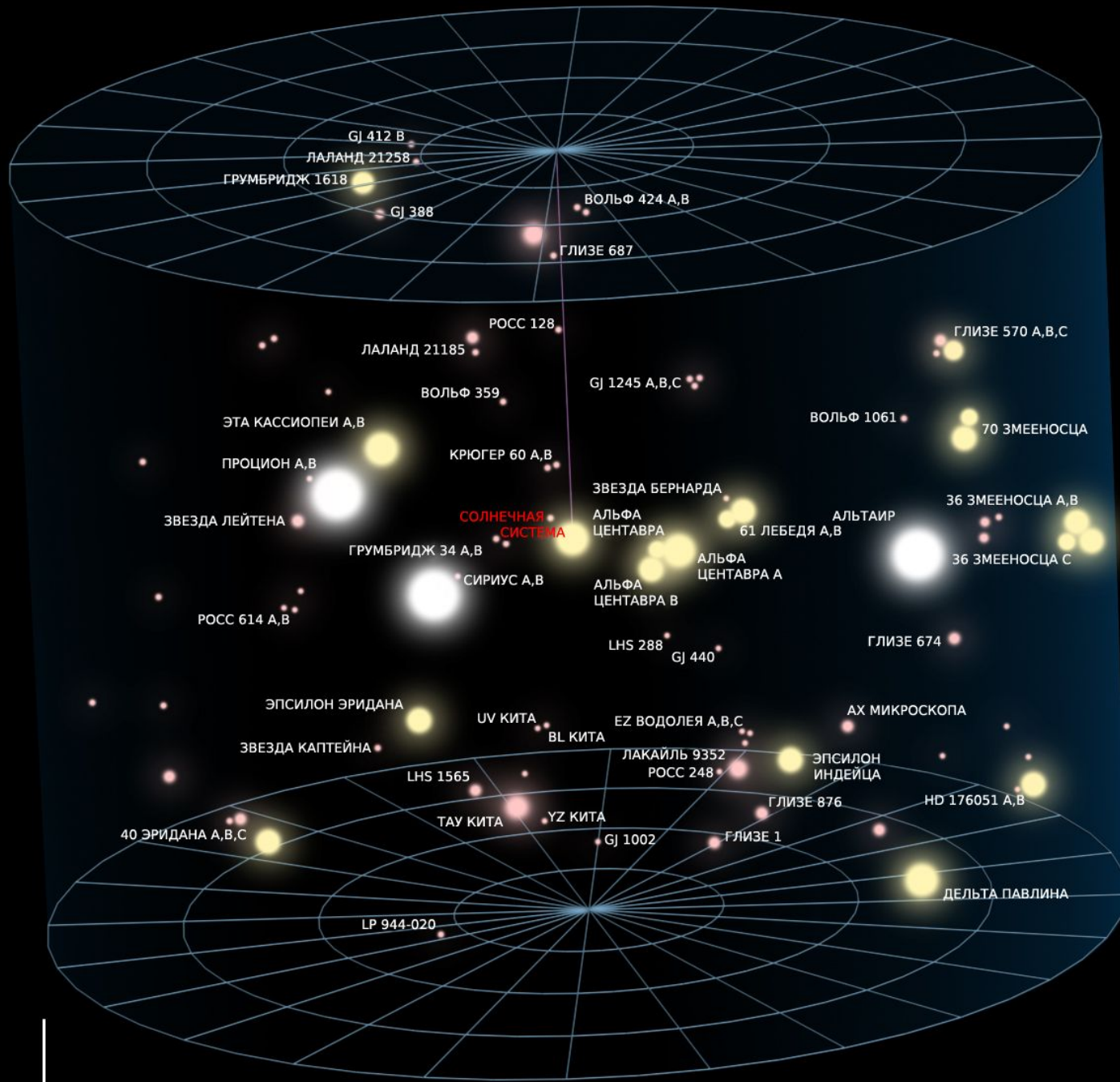


Пятнадцать световых лет

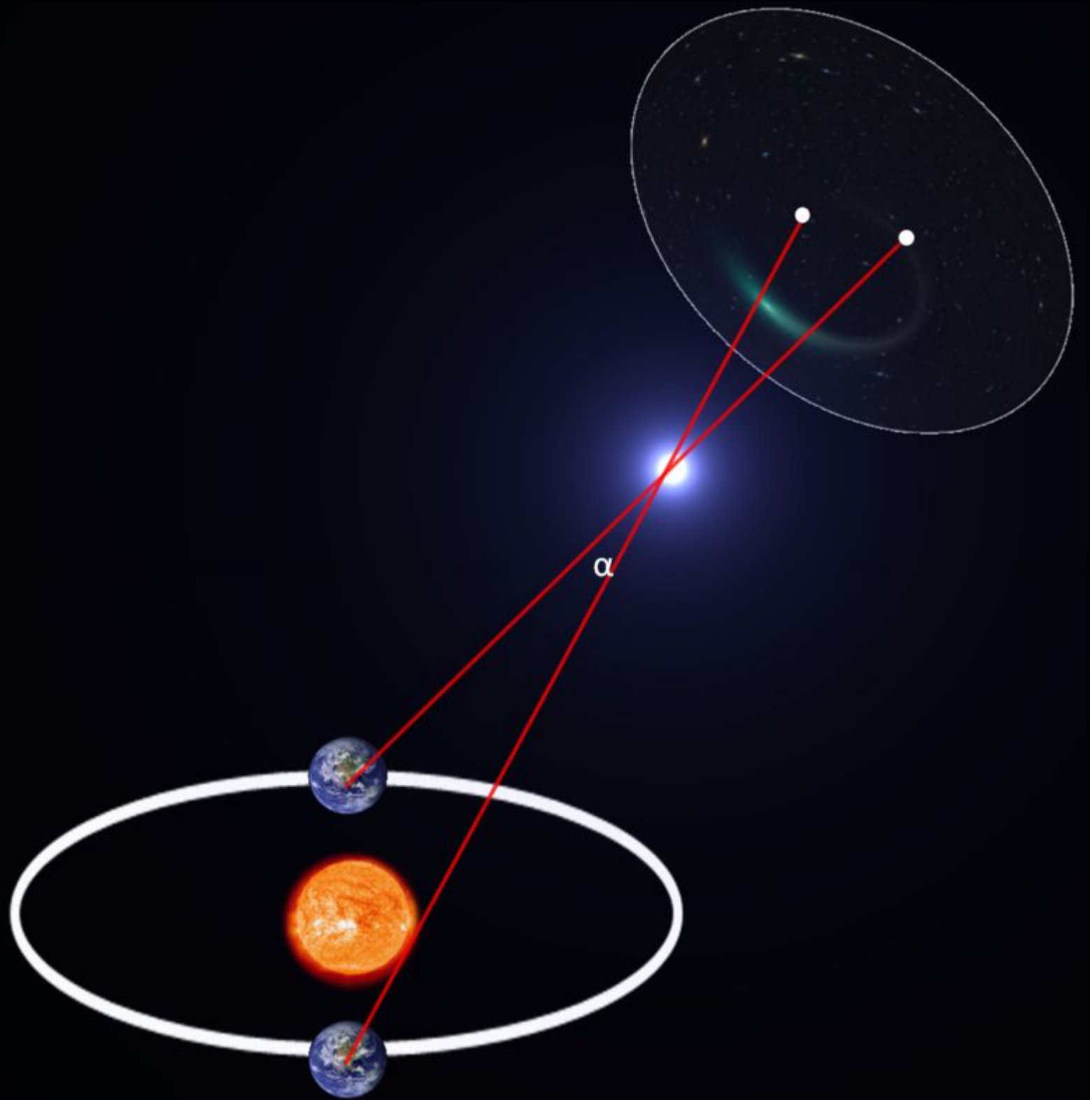
Десять световых лет

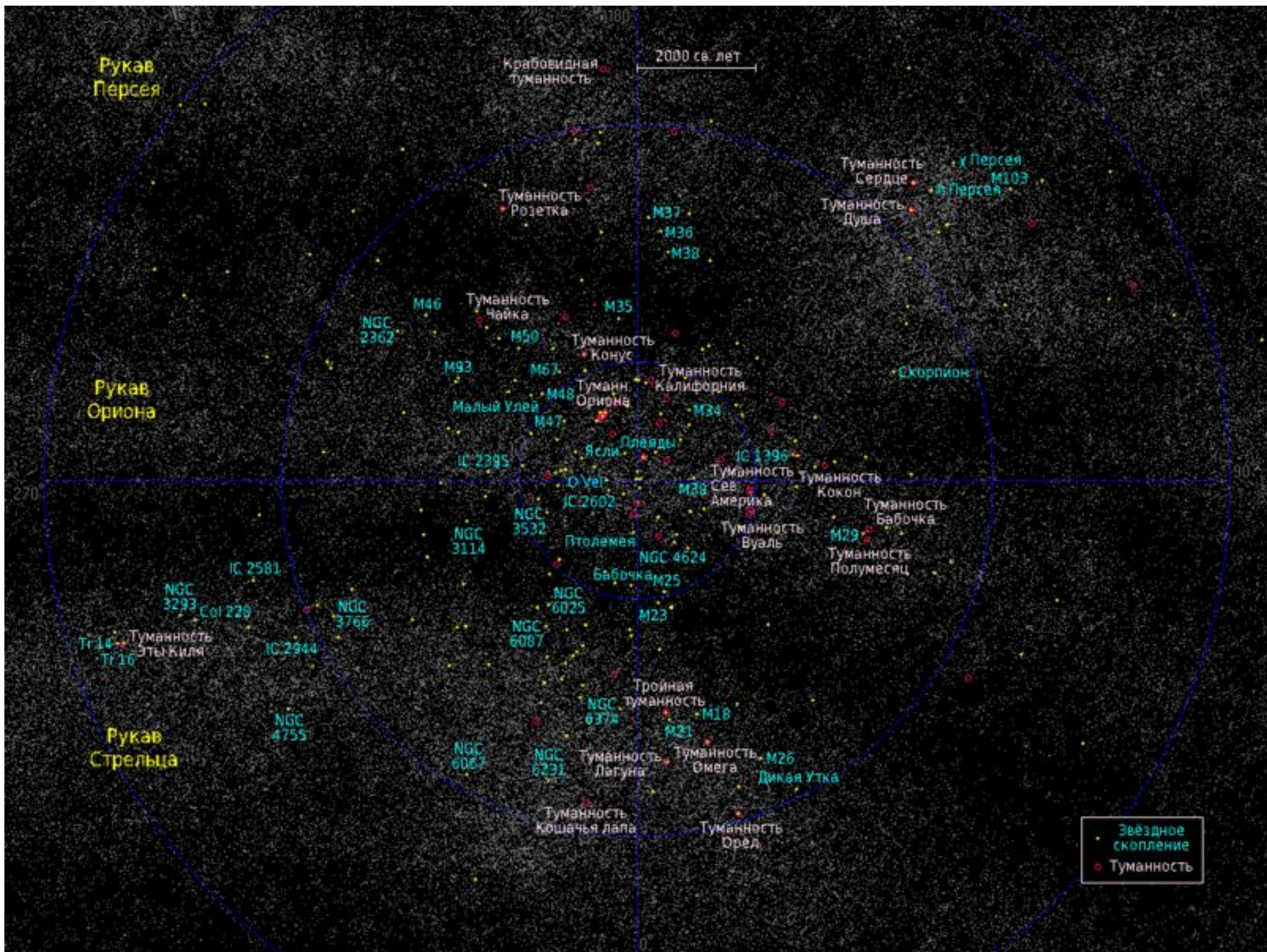
Пять световых лет

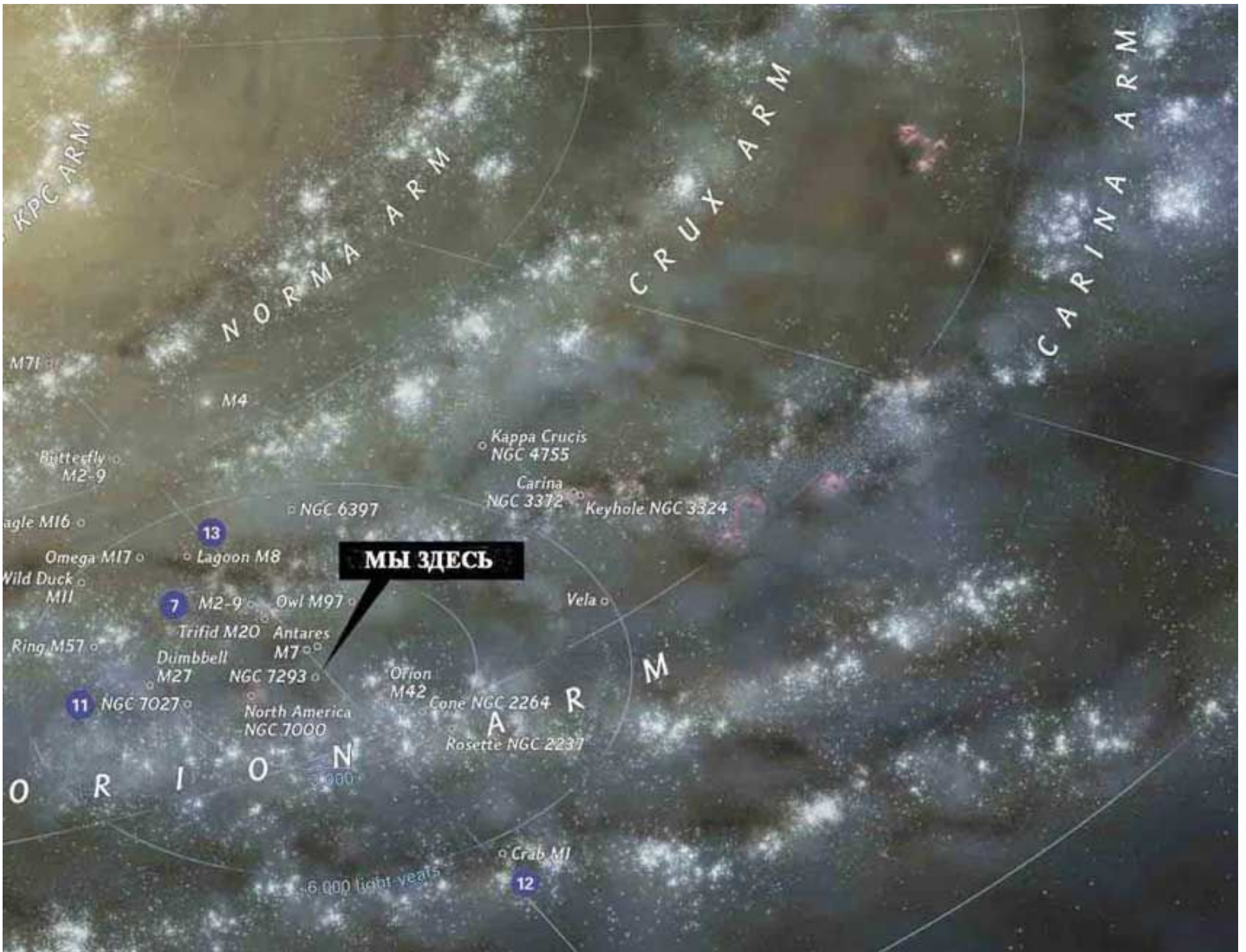




40 световых лет







# THE MILKY WAY

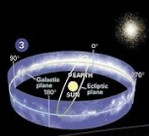


Home galaxy of Earth, the Milky Way is a spiral-shaped system of a few hundred billion stars. Bright regions of recently formed stars highlight its arms, while older stars explode or expel their outer layers as beautiful planetary nebulae, then fade away and die. A thick swarm of orange and red stars marks the galactic bulge, encapsulating the star-packed galactic center. At its core may lie a black hole, a region so dense that not even light can escape its gravitational pull. All objects in the Milky Way orbit the galactic center, much like planets in Earth's solar system revolve around the sun. But the scale is staggering: Light from a star at one edge of the galaxy takes about 100,000 years to reach the opposite side.



**GUIDE TO THE GALAXY**

- 1 Far beyond the galactic disk, yet drawn by its gravity, lone stars and globular clusters wander the galaxy's halo. Regions of dark matter—material not felt through its gravitational effects—extend beyond that.
- 2 Vast clouds of interstellar dust block much of our night sky view of the Milky Way, which from our position in the flat galactic disk appears as a hazy band of light. Infrared satellites can see through the dust to reveal the galaxy's structure.
- 3 Earth's orbit around the sun lies at a severe angle to the galactic plane.



Figure"&gt;

Figure"&gt;

Text">

**A TURBULENT HEART**

- 4 A graph based on a radio survey reveals the whirlpool motion of molecular gas in the inner part of our galaxy: It's moving away from Earth (top half) and toward Earth (bottom half). The denser gas appears white, the least dense, blue.
- 5 Massive amounts of energy are released near the center of the Milky Way, producing electrons that race along magnetic field lines, creating wispy remnants of stellar explosions.
- 6 Probing even deeper into the spiral of hot gas that is falling toward what may be a black hole some 2.6 million times as massive as the sun.

This computer-generated image of the Milky Way—only a part of a 3-D model newly compiled for National Geographic—incorporates the actual positions of hundreds of thousands of stars and nebulae.

- Galobular star cluster
- Interstellar gas and dust
- Halo
- Young star region (OB star)
- Molecular cloud
- Galactic bulge or center
- Reference numbers for galaxies, nebulae, and star clusters
- Galactic Catalog
- NGC (New General Catalog)
- Coordinate system centered on galactic center

## PLANETARY NEBULA M2-9



Exotic kaleidoscopes of the Milky Way, colorful nebulae and star clusters are found throughout Earth's galaxy. Even run-of-the-mill stars may eventually produce a nebula of surprising beauty. Just as our sun will do in its death throes, a dying star expanded into a red giant and was transformed into the nebula M2-9 (above). At its center shines

a small, hot core, which will cool and fade over eons to come. Its stellar wind, streams of charged particles, rushes outward in opposite directions, like exhaust from boats on both jet engines. The bipolarism, revealed by the Hubble Space Telescope, is common among planetary nebulae. Ultraviolet light from the star heats 100,000 grains and makes them glow. Other types of nebulae exist in our galaxy, including dark nebulae rich in microscopic dust that blocks our view of stars beyond. When a star swells to a dark nebula, the dust particles reflect straight and the black

retires, however every star in the cluster is about the same age, billions of years older than our 4.5-billion-year-old sun.

Feeling squeezed dust clouds toward the center bulge of the Milky Way, the Hubble Space Telescope focused on a rare clear region in the Sagittarius star cloud above right. These Sagittarius stars formed at different times; most are older

than the sun. They sparkle like an assemblage of gems on a jeweler's velvet pad.

In some dark clouds, like strange NGC objects like G339.26, detected by a European Southern Observatory telescope in Chile and mapped in infrared light. A star 20 times as massive as the sun and 10,000 times brighter, it sports a disk of circumstellar dust, almost as large as our solar system. Brown outward, the dust would obscure our view of the center of NGC 7027. Were it not for this remarkable composite image in infrared and

visible light from the Hubble Space Telescope. Clouds of interstellar dust (right) stream over huge regions along the central plane of the Milky Way, are not thick and smooth but seem as frothy as the head on a plane of beer. Supernova shock waves and stellar wind from

growing stars may have shaped this surprising pattern.

When a massive star comes to the end of its nuclear fuel supply, it collapses and then rebounds in a brief, powerful explosion, or supernova. The Chinese called these celestial fireworks quest stars and recorded one such event in the constellation Boötes in July 1054 that was visible in broad daylight.

In that location today astronomers find the fast-expanding Crab Nebula (left), a supernova remnant. At its heart lies a pulsar—a collapsed star—whirling 30 times a second.

Somehow collisions of the Milky Way host equally remarkable celestial phenomena. In the Large Magellanic Cloud (above right), 180,000 light-years from

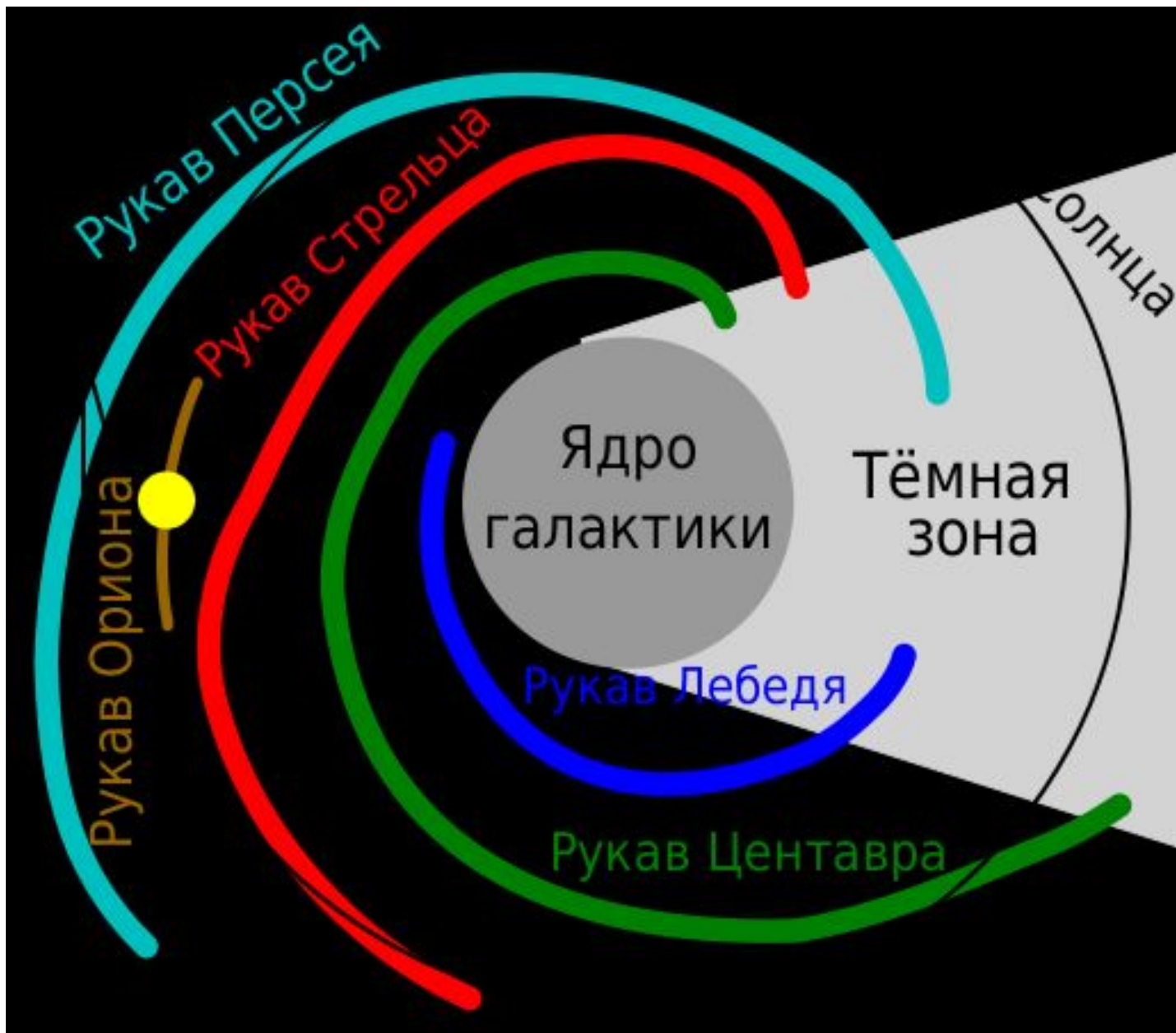
Earth, clumpy, filamentary clouds of hydrogen gas reveal their stately march in a radio map from the Australia Telescope Compact Array. The lower half of the cloud (left) is rotating toward the Earth while the top half (right) turns away.

Clustering along the spiral arms of the galaxy, bright emission nebulae mark regions where new stars are forming. The Lagoon Nebula (below), about 8,000 light-years distant, is easily denoted with the naked eye as a fuzzy spot in the southern constellation Sagittarius. Wide-field images show that it covers more of

the sky than does the full moon. Where stars were once only a vast dark cloud, radiation from the brightest and most massive young star in the nebula, Herbig-Haro 26, heats and ionizes the gas around it. The famous Orion Nebula, such areas are equally little more than hot blazes on the flanks of giant interstellar clouds.

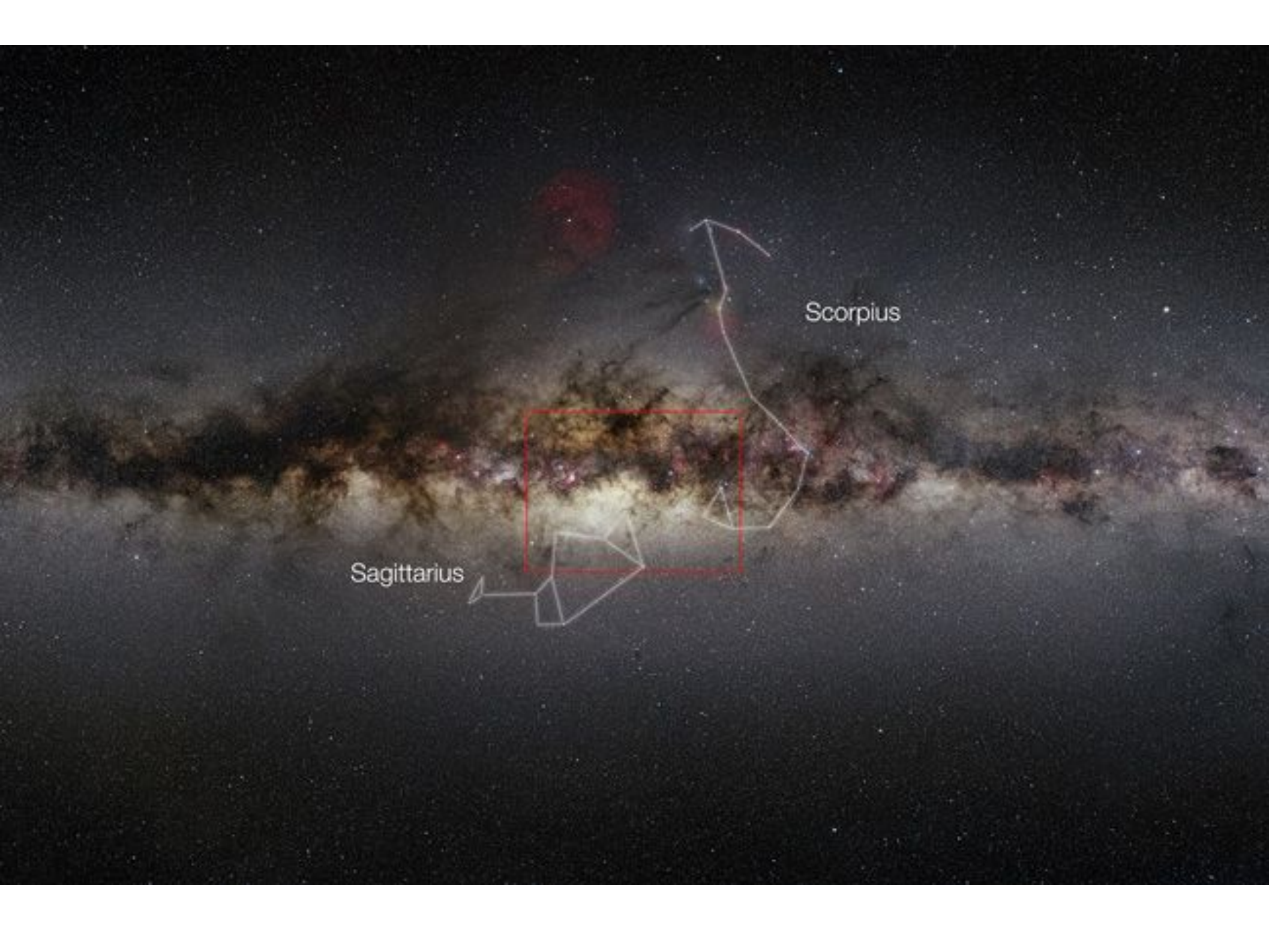
With new tools, astronomers are unravelling the nature of the Milky Way and measuring distances to stars and nebulae with greater accuracy. Still, they ask, how did the Milky Way form in the first place? How and when did the arms form? How many more objects exist nearby? And the biggest question of all: Do any of them harbor life?

- Primary contributors:**  
 Peter B. Stetson, University of Arizona  
 David R. Sasselov, NASA Ames Research Center  
 David L. Buzik, University of Arizona  
 John M. Rhee, University of Arizona  
 Brian P. Schmidt, University of Arizona  
 John M. Rhee, University of Arizona  
 Peter B. Stetson, University of Arizona  
 David R. Sasselov, NASA Ames Research Center  
 David L. Buzik, University of Arizona  
 John M. Rhee, University of Arizona  
 Brian P. Schmidt, University of Arizona



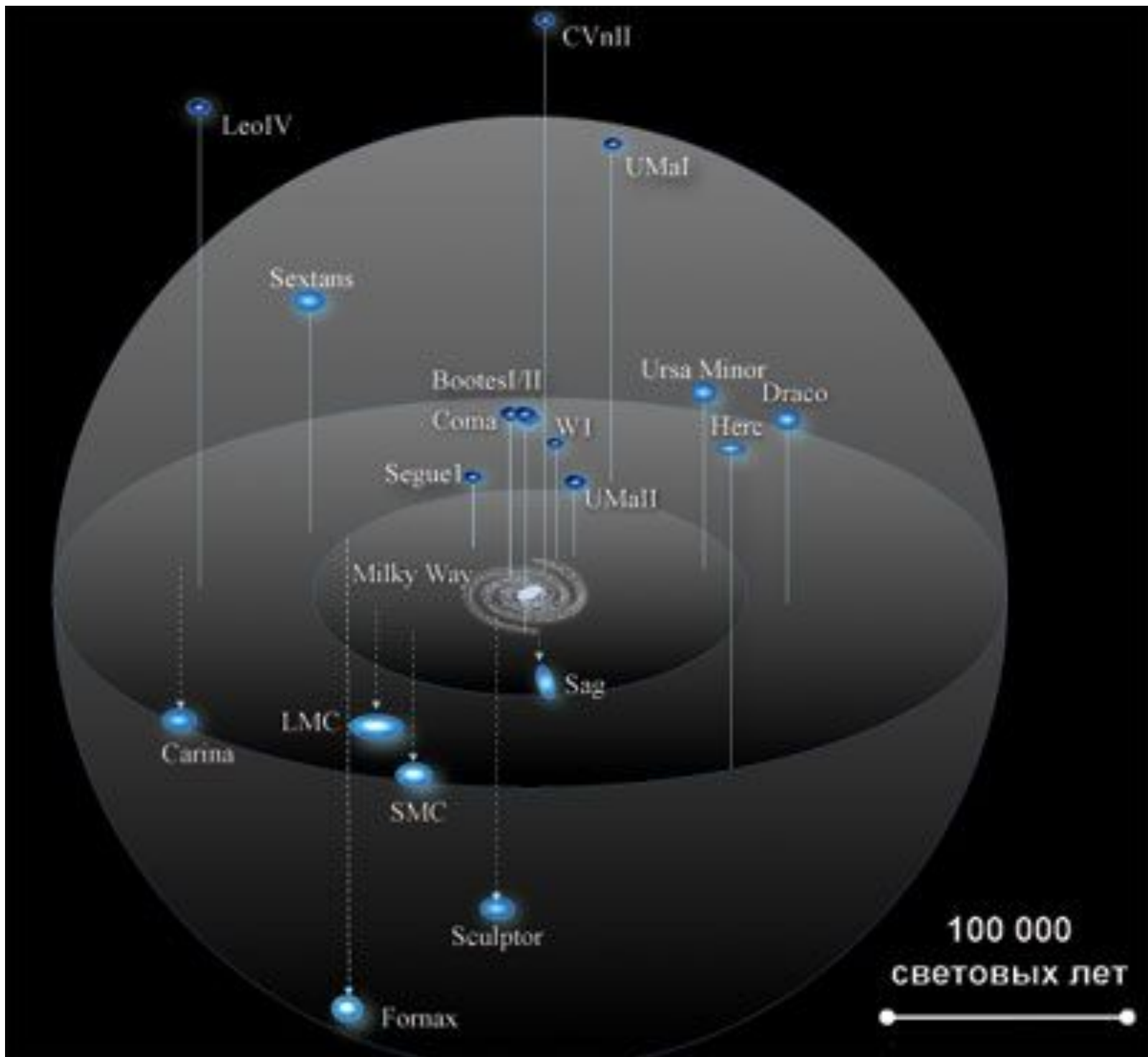


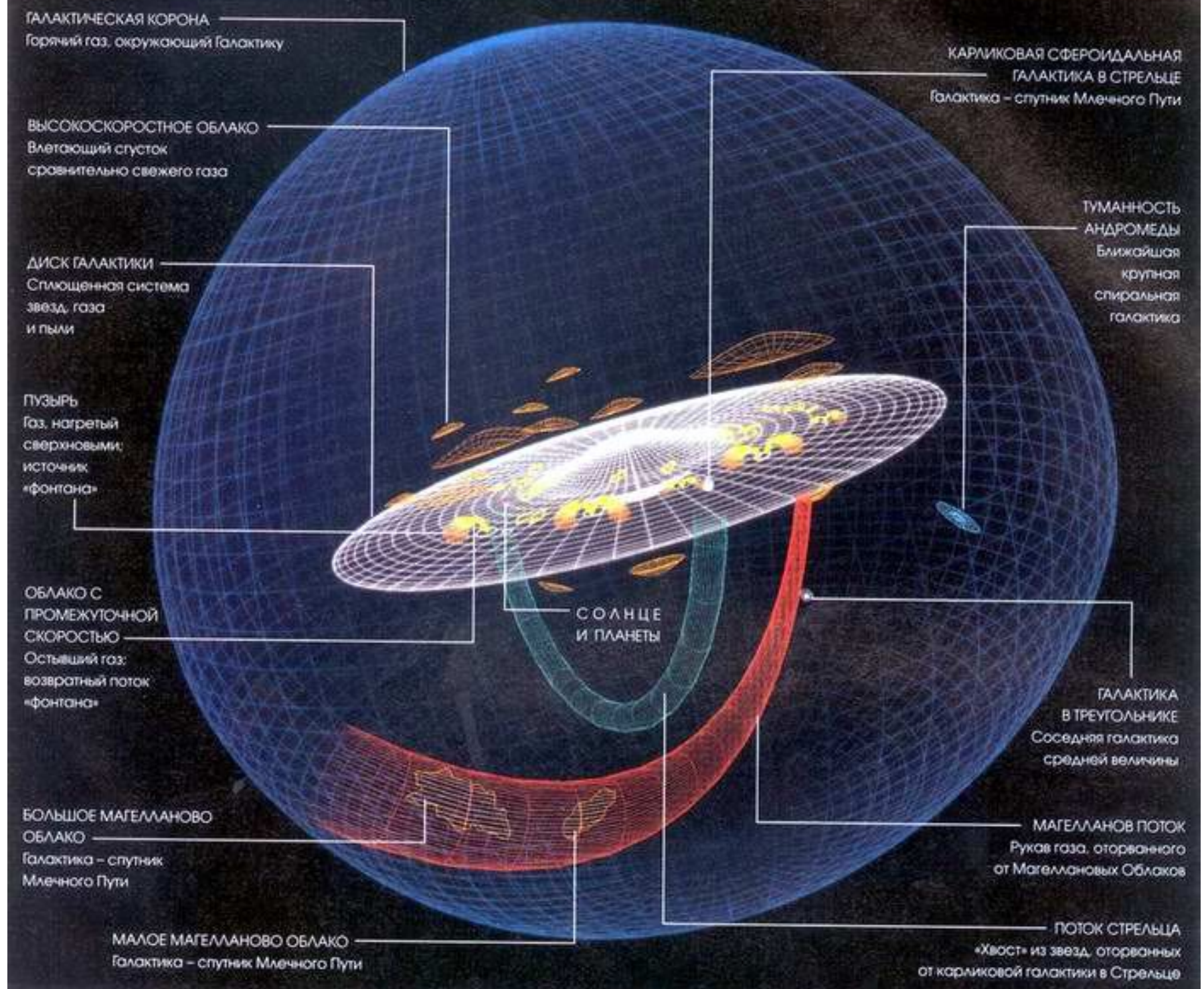




Scorpius

Sagittarius





**ГАЛАКТИЧЕСКАЯ КОРОНА**  
Горячий газ, окружающий Галактику

**ВЫСОКОСКОРОСТНОЕ ОБЛАКО**  
Влетающий сгусток  
сравнительно свежего газа

**ДИСК ГАЛАКТИКИ**  
Сплюснутая система  
звезд, газа  
и пыли

**ПУЗЫРЬ**  
Газ, нагретый  
сверхновыми;  
источник  
«фонтана»

**ОБЛАКО С  
ПРОМЕЖУТОЧНОЙ  
СКОРОСТЬЮ**  
Остывший газ;  
возвратный поток  
«фонтана»

**БОЛЬШОЕ МАГЕЛЛАНОВО  
ОБЛАКО**  
Галактика – спутник  
Млечного Пути

**МАЛОЕ МАГЕЛЛАНОВО ОБЛАКО**  
Галактика – спутник Млечного Пути

**КАРЛИКОВАЯ СФЕРОИДАЛЬНАЯ  
ГАЛАКТИКА В СТРЕЛЬЦЕ**  
Галактика – спутник Млечного Пути

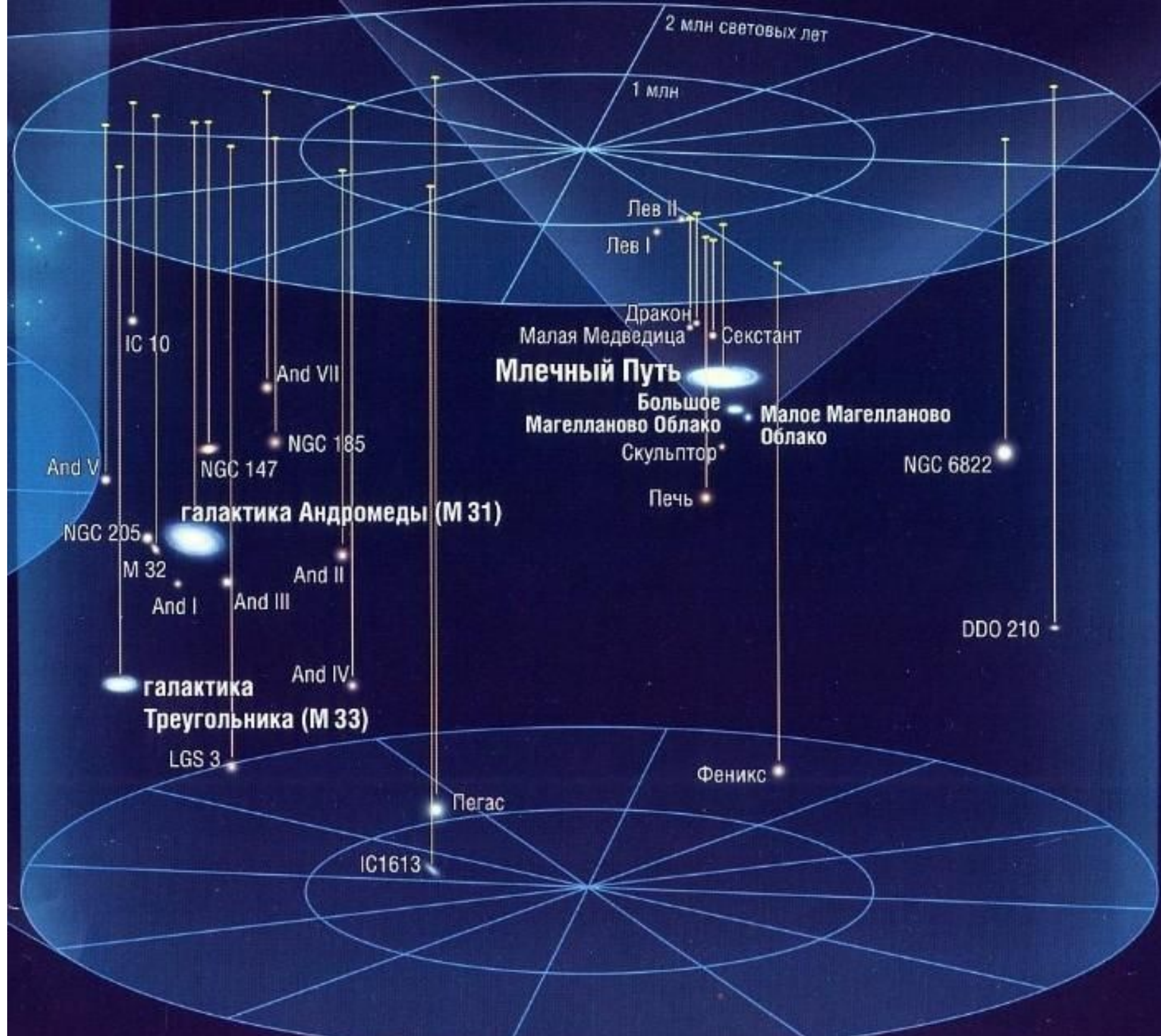
**ТУМАННОСТЬ  
АНДРОМЕДЫ**  
Ближайшая  
крупная  
спиральная  
галактика

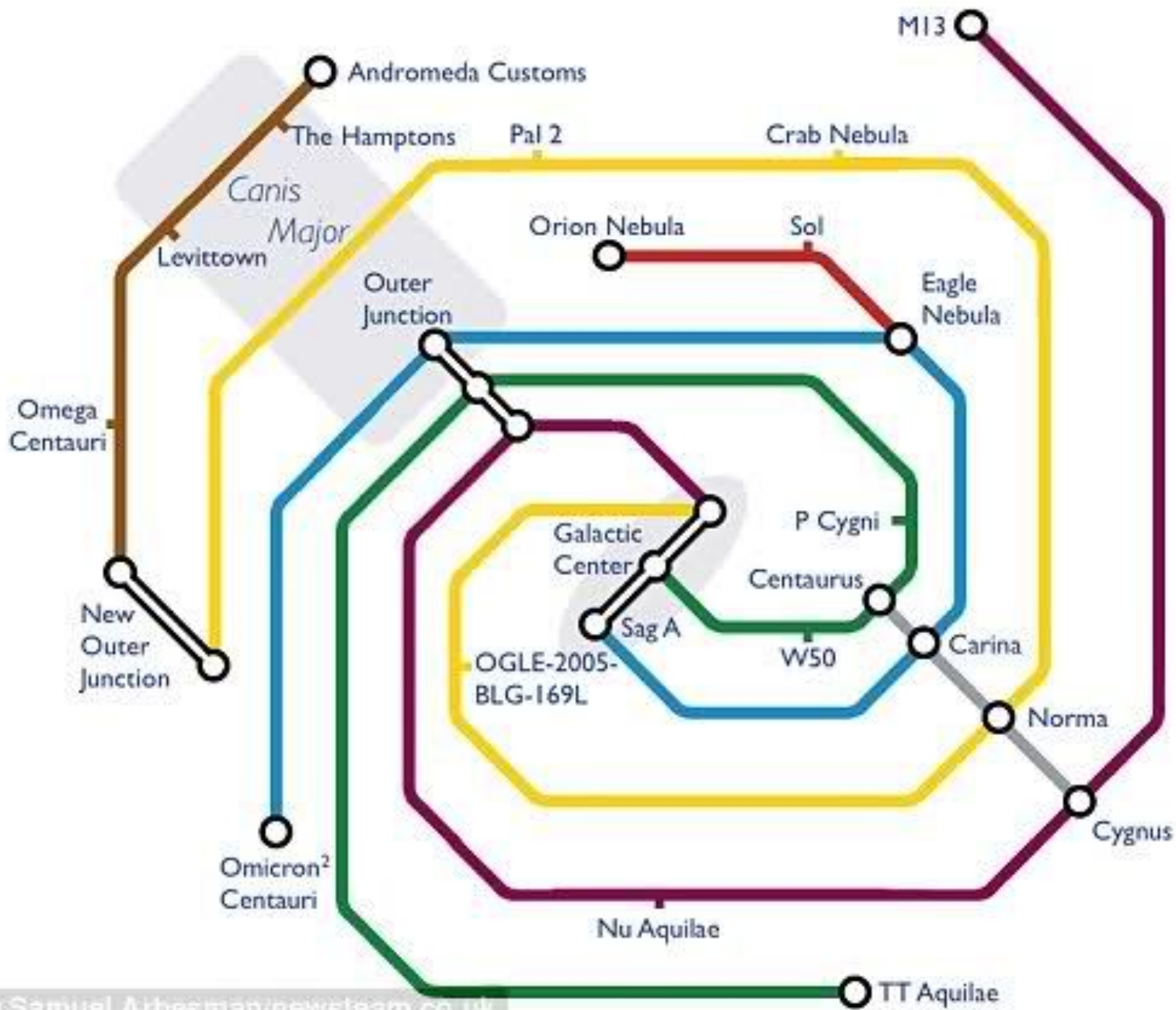
**СОЛНЦЕ  
И ПЛАНЕТЫ**

**ГАЛАКТИКА  
В ТРЕУГОЛЬНИКЕ**  
Соседняя галактика  
средней величины

**МАГЕЛЛАНОВ ПОТОК**  
Рукав газа, оторванного  
от Магеллановых Облаков

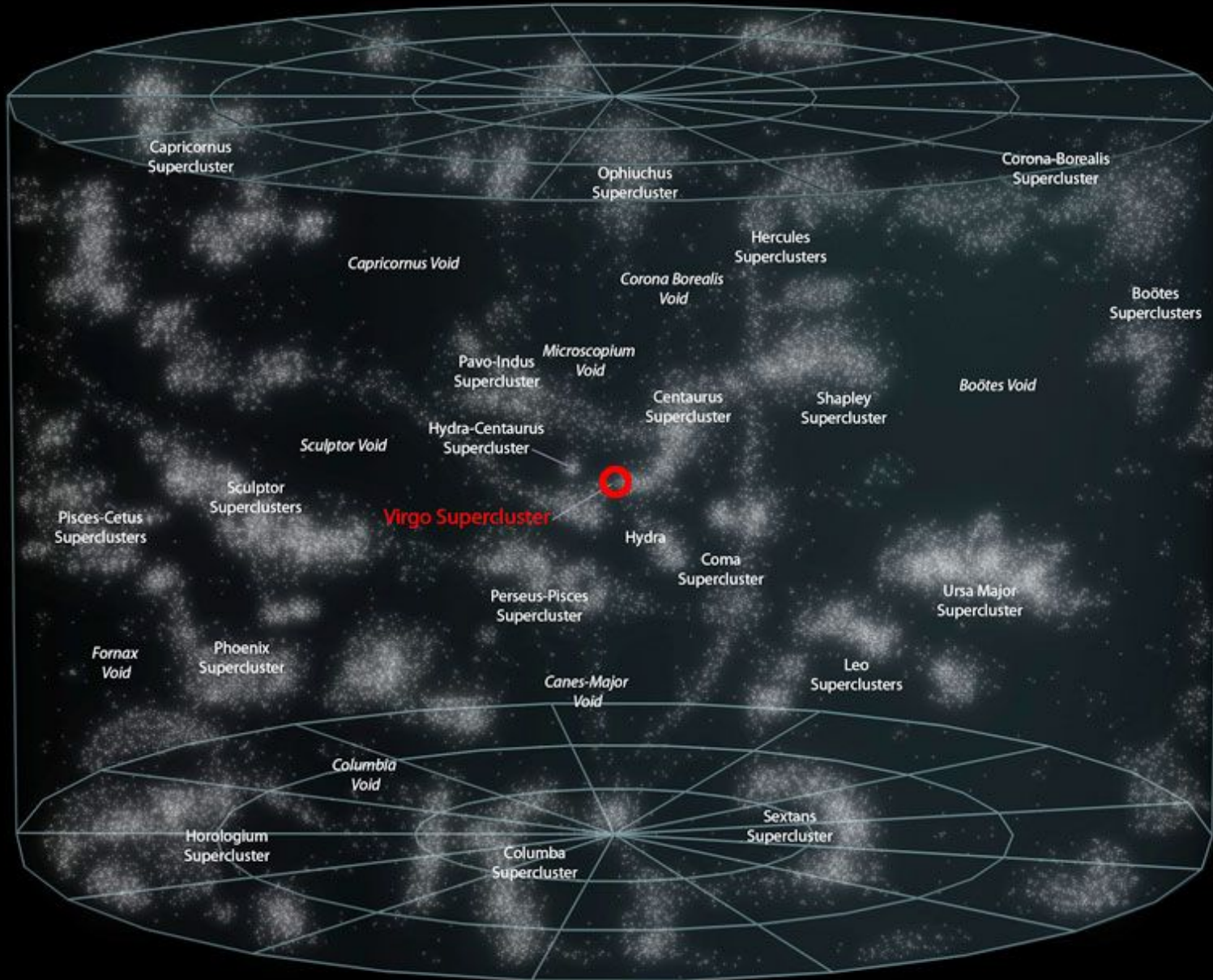
**ПОТОК СТРЕЛЬЦА**  
«Хвост» из звезд, оторванных  
от карликовой галактики в Стрельце





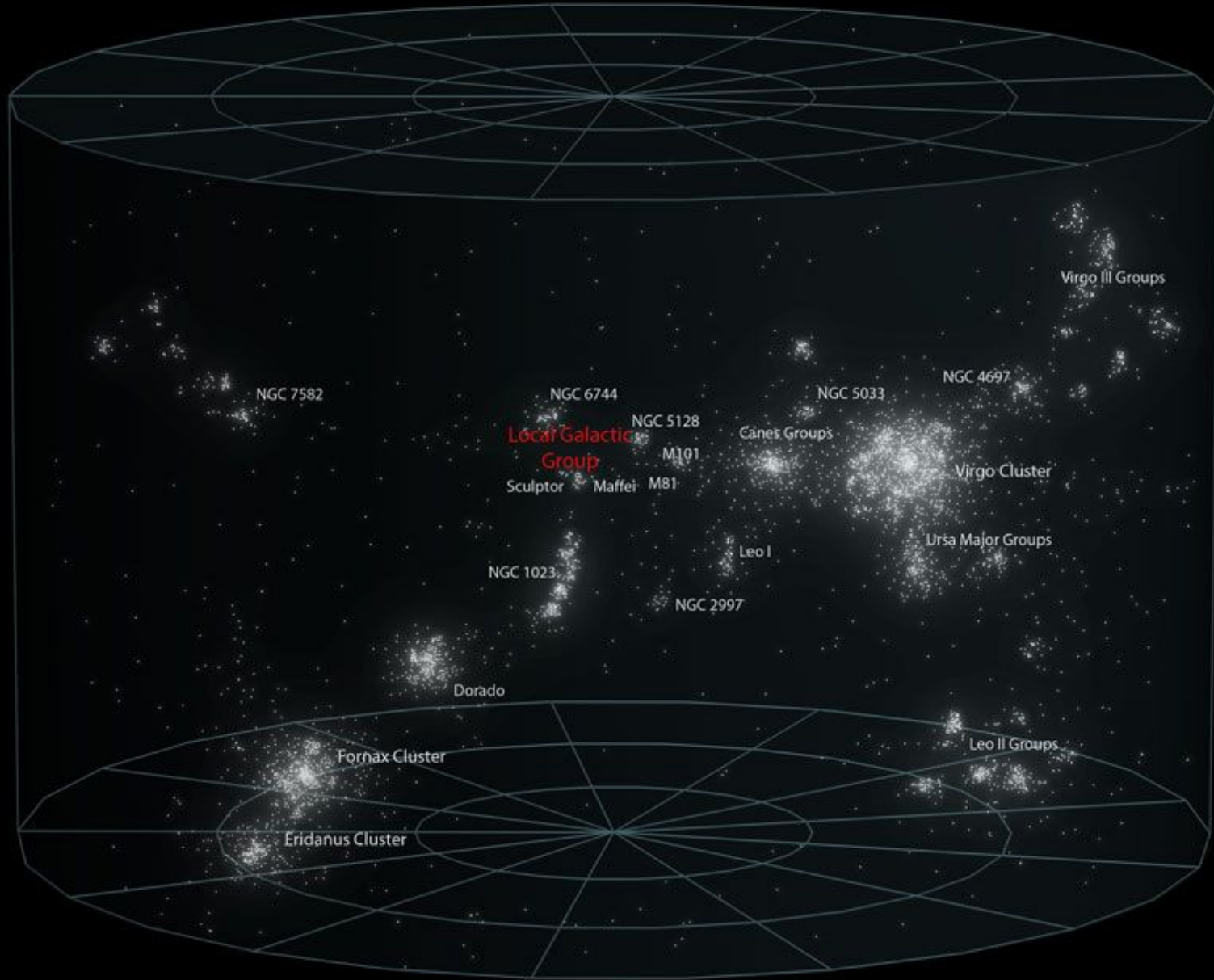
- Orion
- Sagittarius
- Crux-Scutum
- 3 Kiloparsec
- Outer
- Suburban
- Express

# Local Superclusters



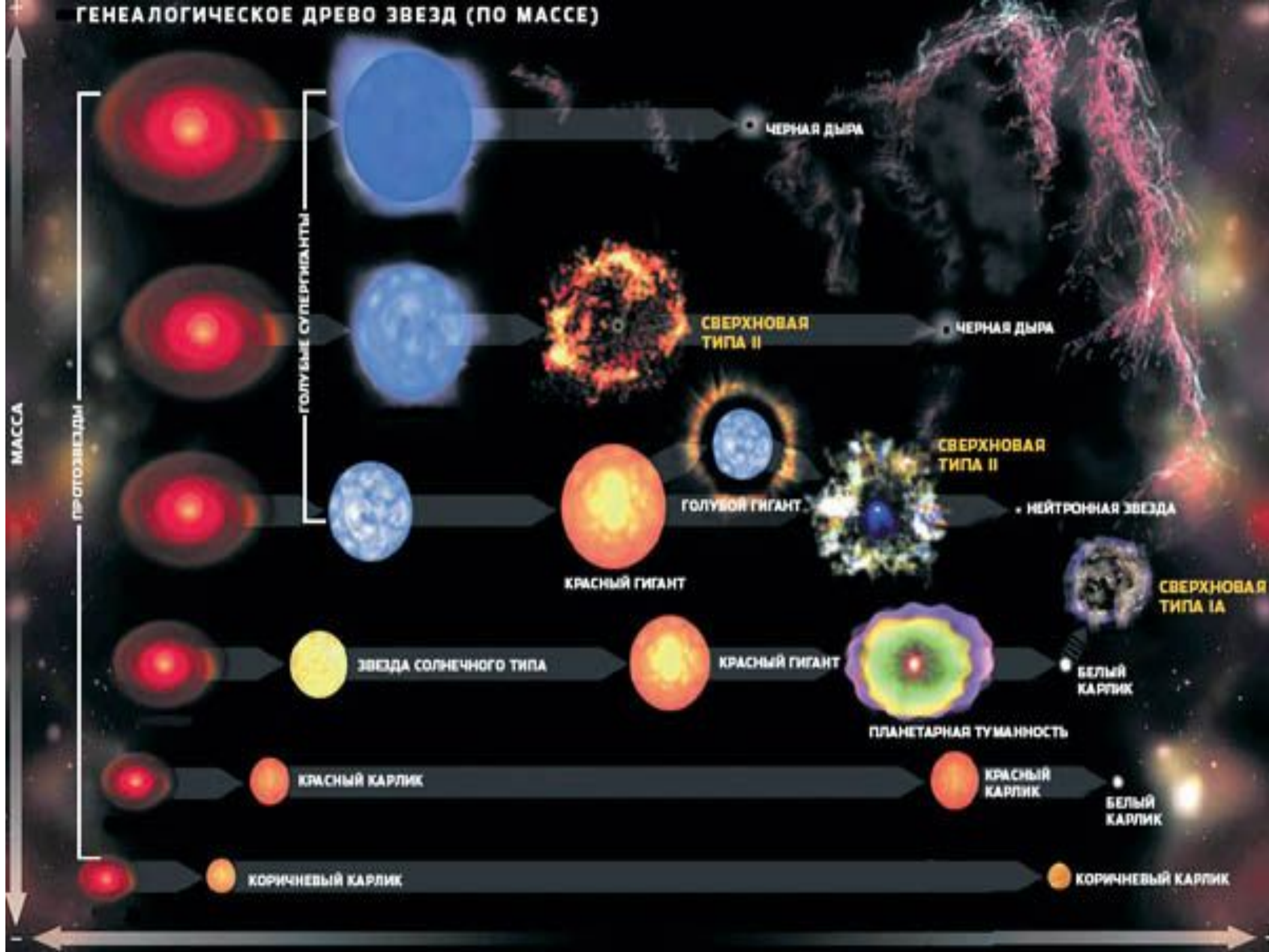


# Virgo Supercluster

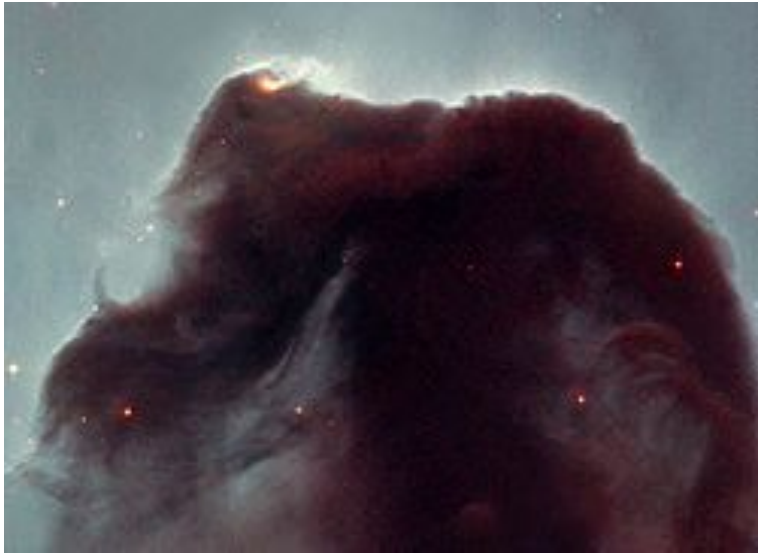




# ГЕНЕАЛОГИЧЕСКОЕ ДРЕВО ЗВЕЗД (ПО МАССЕ)



## • Тёмная туманность



## Отражательная туманность



## • Туманности ионизованные



## Планетарные туманности



• Остаток сверхновой



Туманности, созданные ударными



• Туманности вокруг O-звёзд

блуждания



Туманности в областях

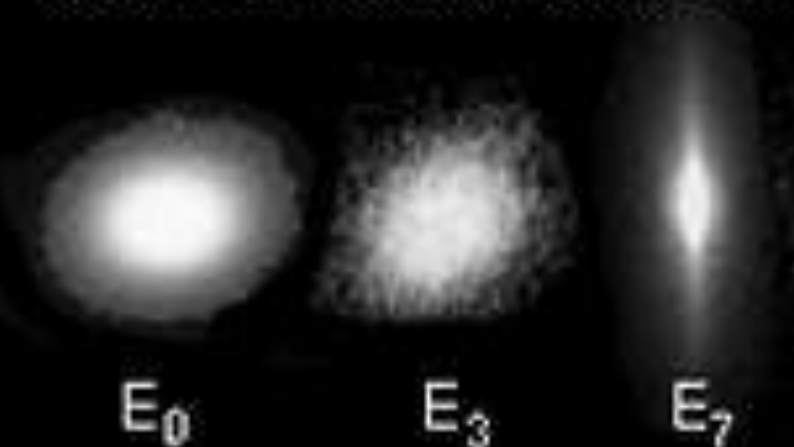




Спиральные галактики



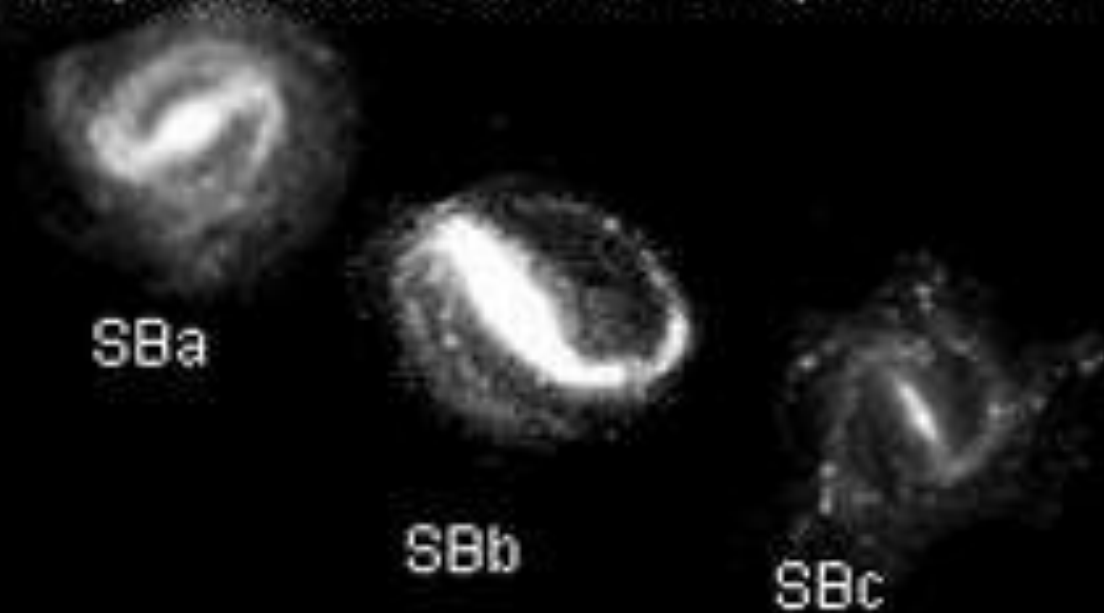
Эллиптические галактики



Sa

S<sub>0</sub>

Спиральные галактики с перемычкой



SBa

SBb

SBc