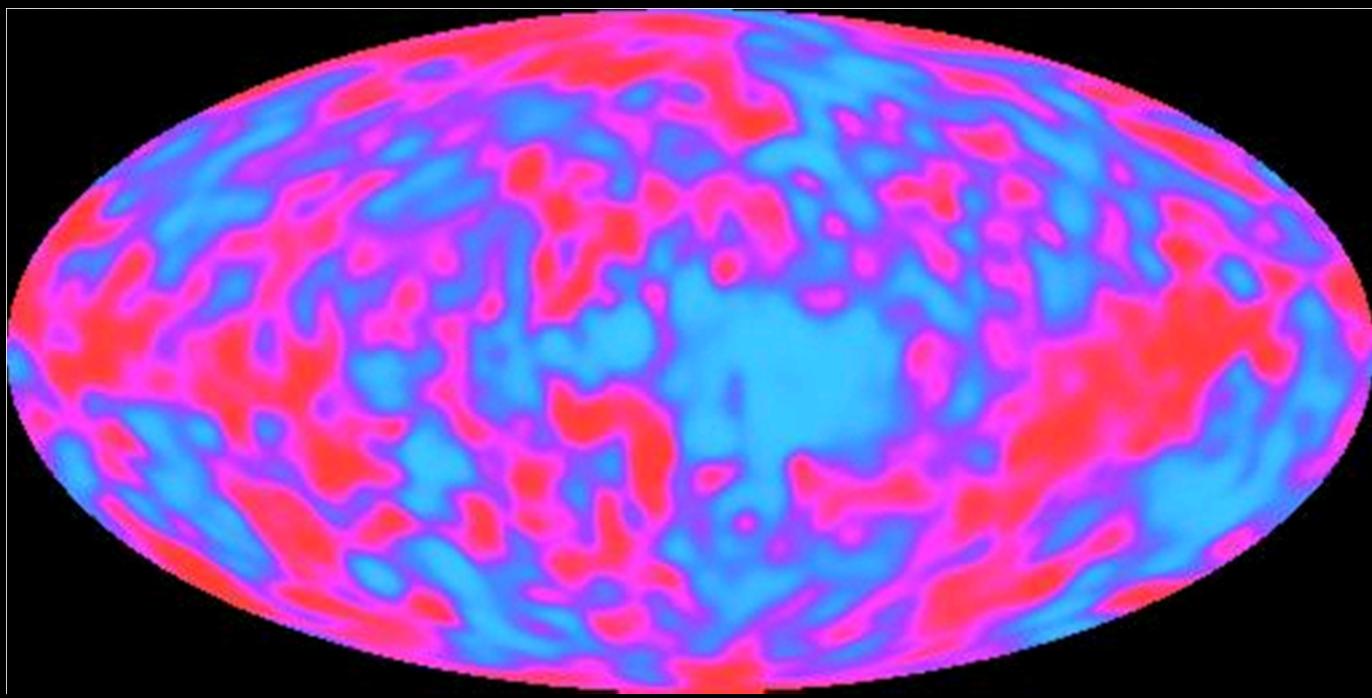


Didysis sprogimas



Mikelandželo "Pasaulio sukūrimas"

Siksto kapelos lubose

Dievas sukūrė Saulę, Ménulį ir žvaigždes



Laikas

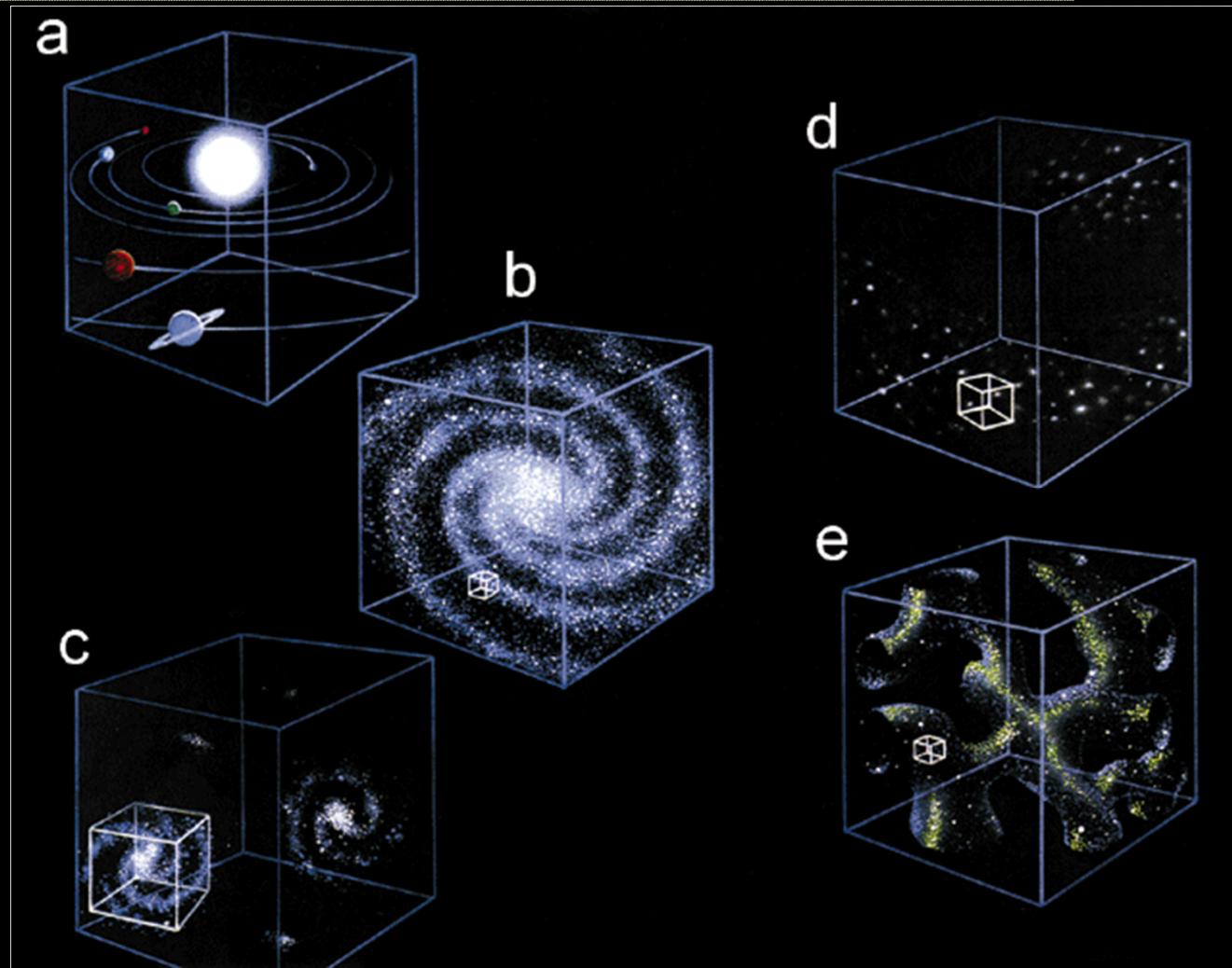
Visatos amžius	10^{17}
Žemės amžius	10^{17}
Žmogaus amžius	10^9
Metai	10^7
Diena	10^5
Laiko tarpas per kurį mus pasiekia Saulės šviesa (8min.)	10^3
Širdies plakimas	10^0
Musės sparnelių mostas	10^{-3}
Sparčiausia elektronika	10^{-12}
Trumpiausias lazerio šviesos impulsas	10^{-16}
Laikas per kurį šviesa nusklinda atomo skersmens atstumą	10^{-18}
Trumpiausiai gyvuojanti elementarioji dalelė	10^{-24}
Planko trukmė	10^{-44}

Erdvė

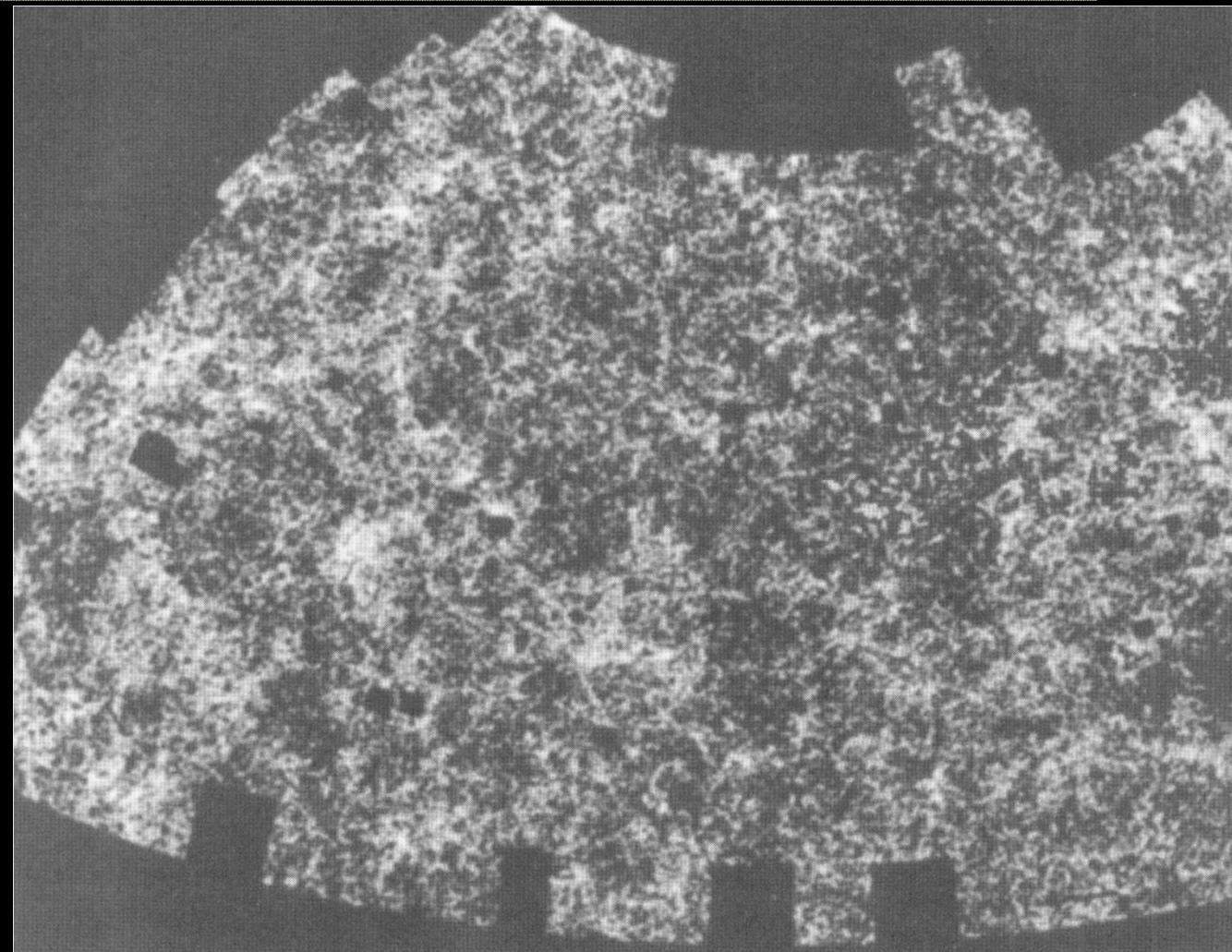
Mega-pasaulis	Tolimiausias stebėtas objektas Atstumas iki artimiausios galaktikos	10^{26} 10^{22}
	Atstumas iki artimiausios žvaigždės	10^{17}
	Atstumas iki Saulės (a.v.)	10^{11}
makro	Žemės skersmuo Kilometras Žmogaus aukštis Piršto storis Popieriaus storis	10^7 10^3 10^0 10^{-2} 10^{-4}
mezo	Didelė bakterija Mažas virusas Molekulė (nedidelė)	10^{-5} 10^{-8} 10^{-9}
mikro	Atomo skersmuo Atomo branduolio skersmuo Mažiausias atstumas tiriamas greitintuvuose Planko ilgis (ilgio kvantas)	10^{-10} 10^{-15} 10^{-18} 10^{-35}

Visata

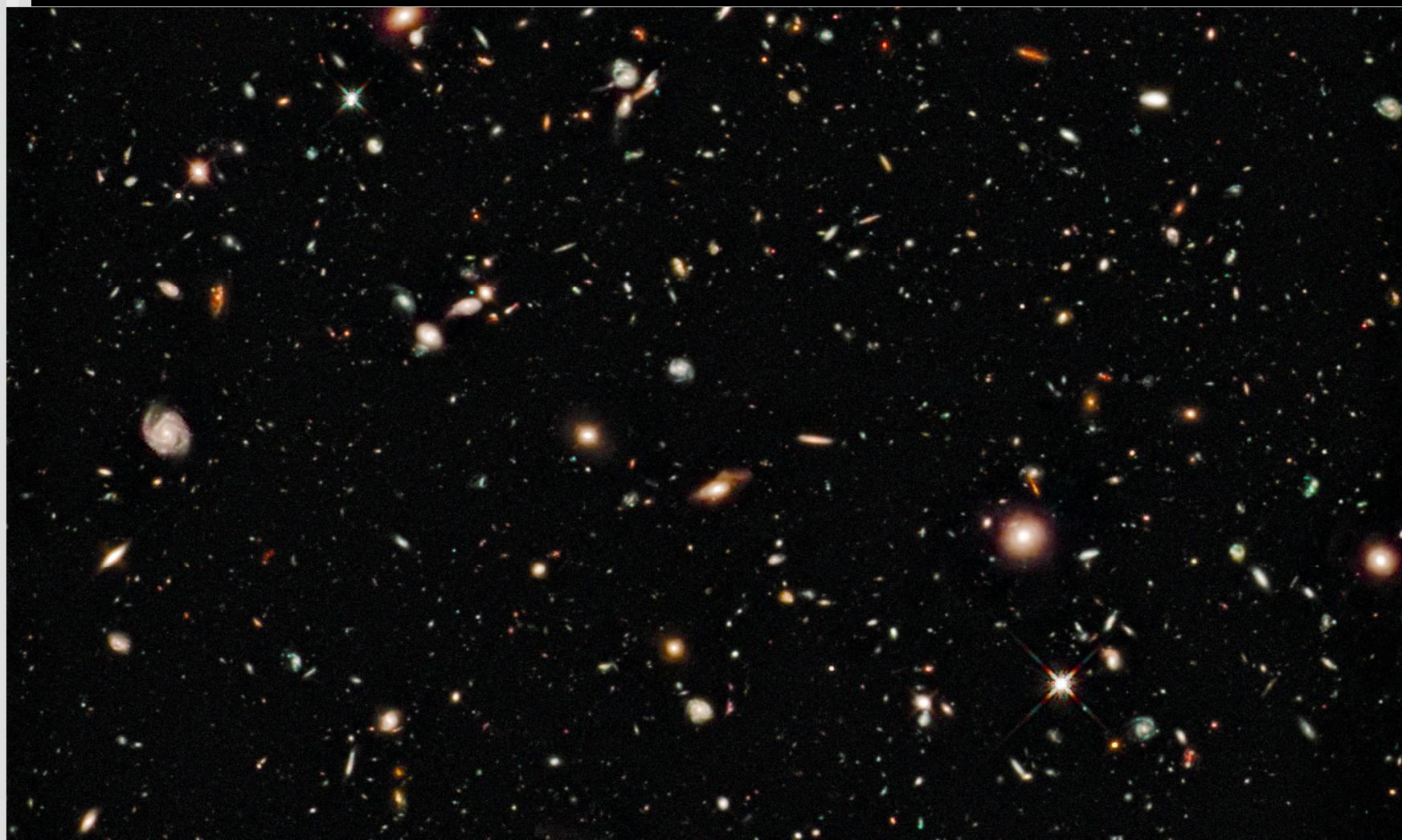
- a. – Saulės sistema - 10.4 šv.s.
- b. – Mūsų galaktika
- c. – Mūsų galaktika kartu su Andromedos galaktika, lokali grupė, 10 milijonų šv.m.
- d. – Galaktikų superklasteris 60 millionų šv.m.
- e. – Didysis atraktorius



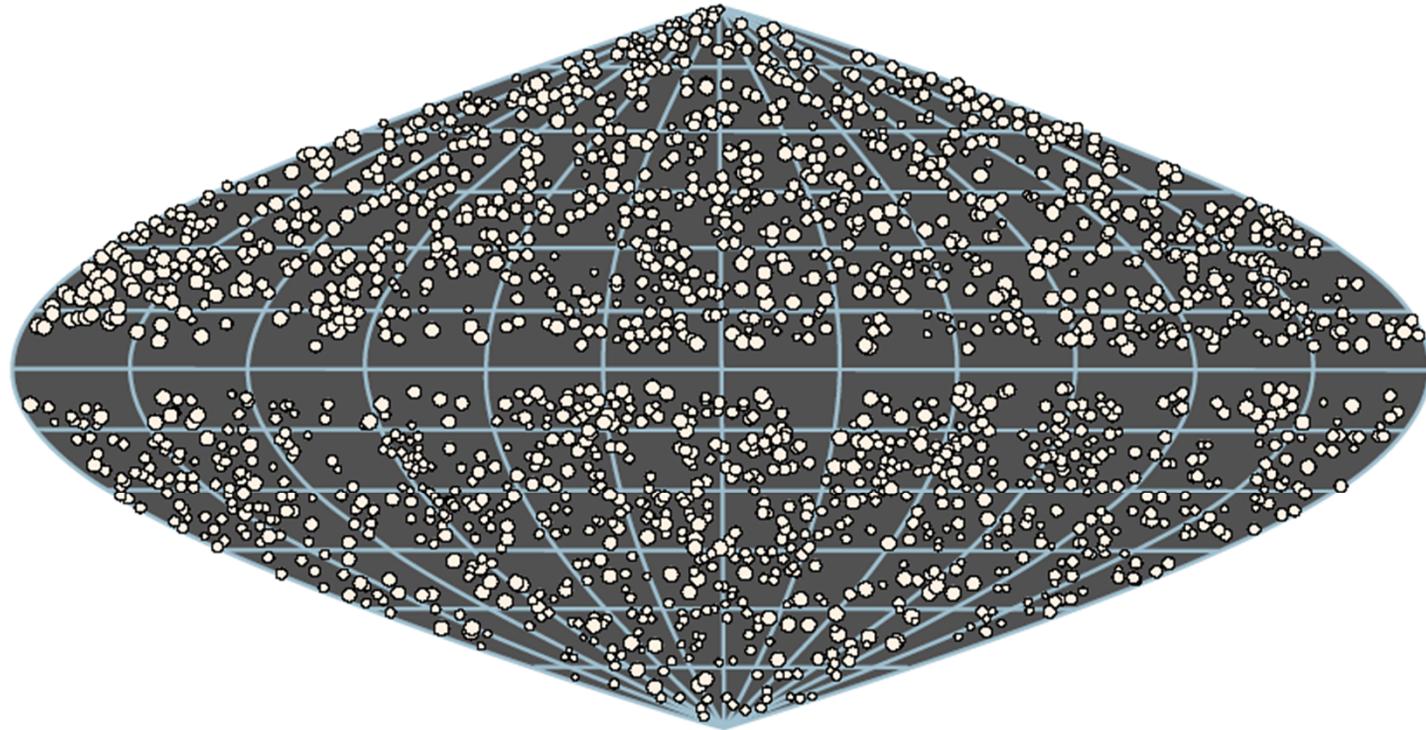
Galaktikos, 8% dangaus skliauto
1.5 milijono galaktikų



Hablo teleskopo giliausias visatos vaizdas

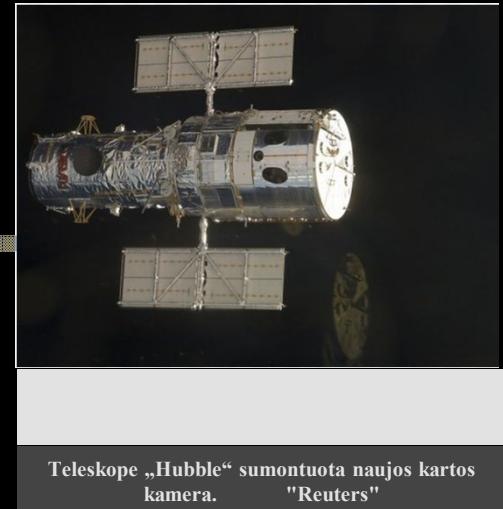
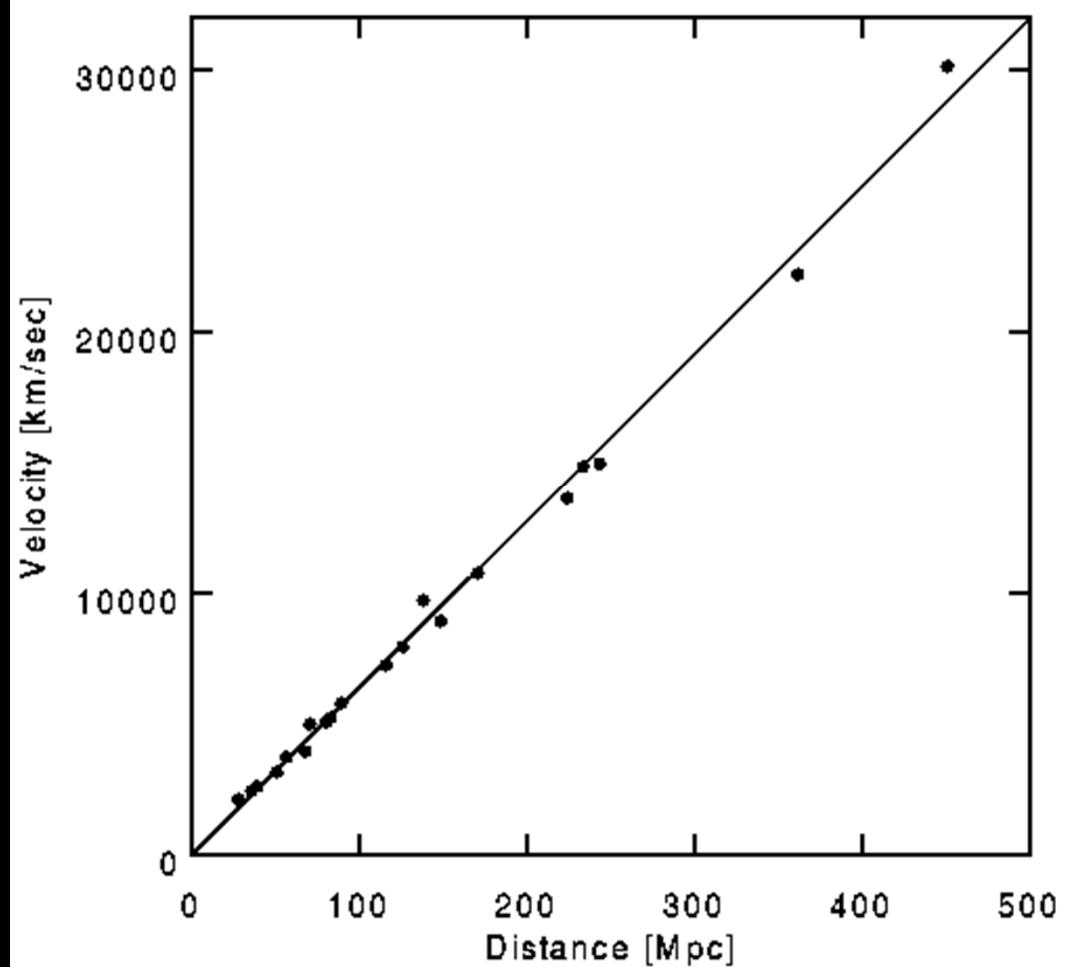


Visata



HOMOGENEOUS DISTRIBUTION of galaxies is apparent in a map that includes objects from 300 to 1,000 million light-years away. The only inhomogeneity, a gap near the center line, occurs because part of the sky is obscured by the Milky Way. Michael Strauss of the Institute for Advanced Study in Princeton, N.J., created the map using data from NASA's *Infrared Astronomical Satellite*.

Hablo dėsnis

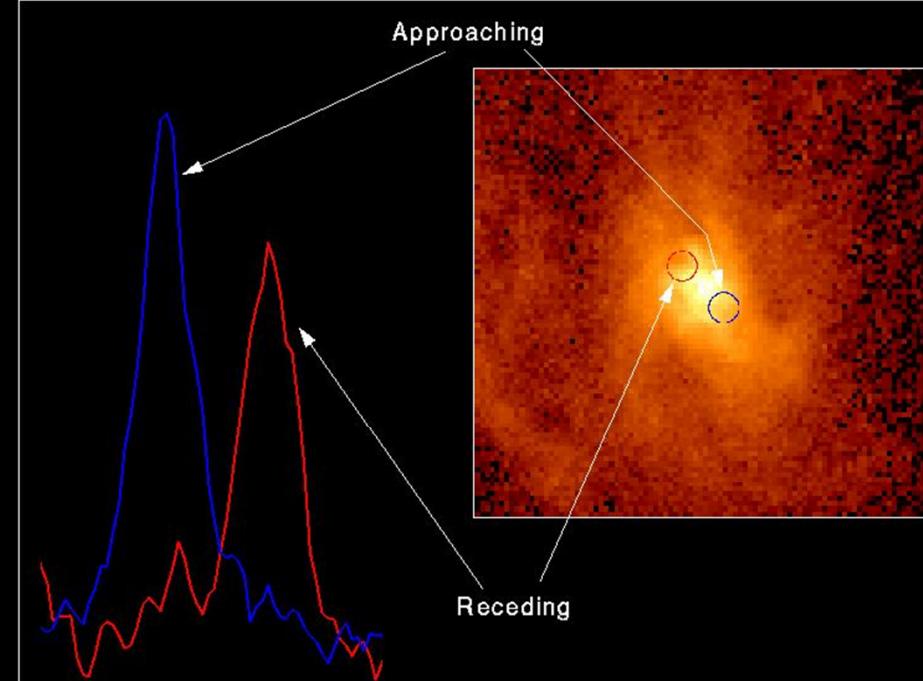


Teleskope „Hubble“ sumontuota naujos kartos kamera. "Reuters"

av šm

Doplerio reiškinys

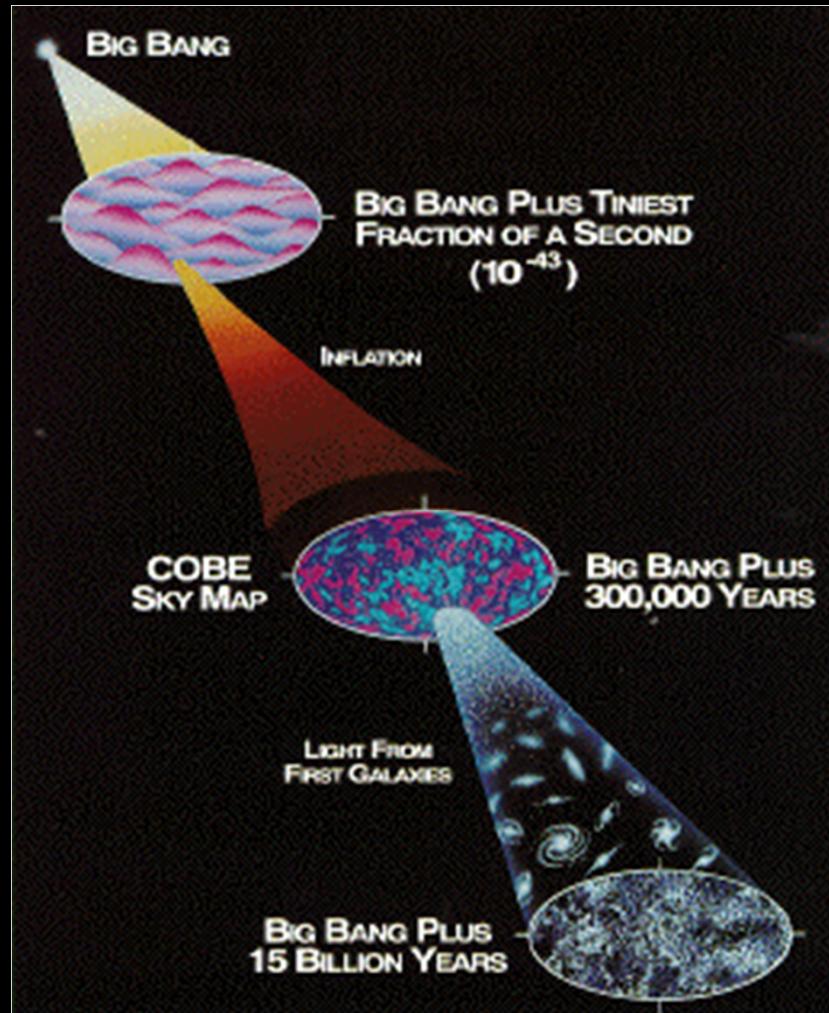
Spectrum of Gas Disk in Active Galaxy M87



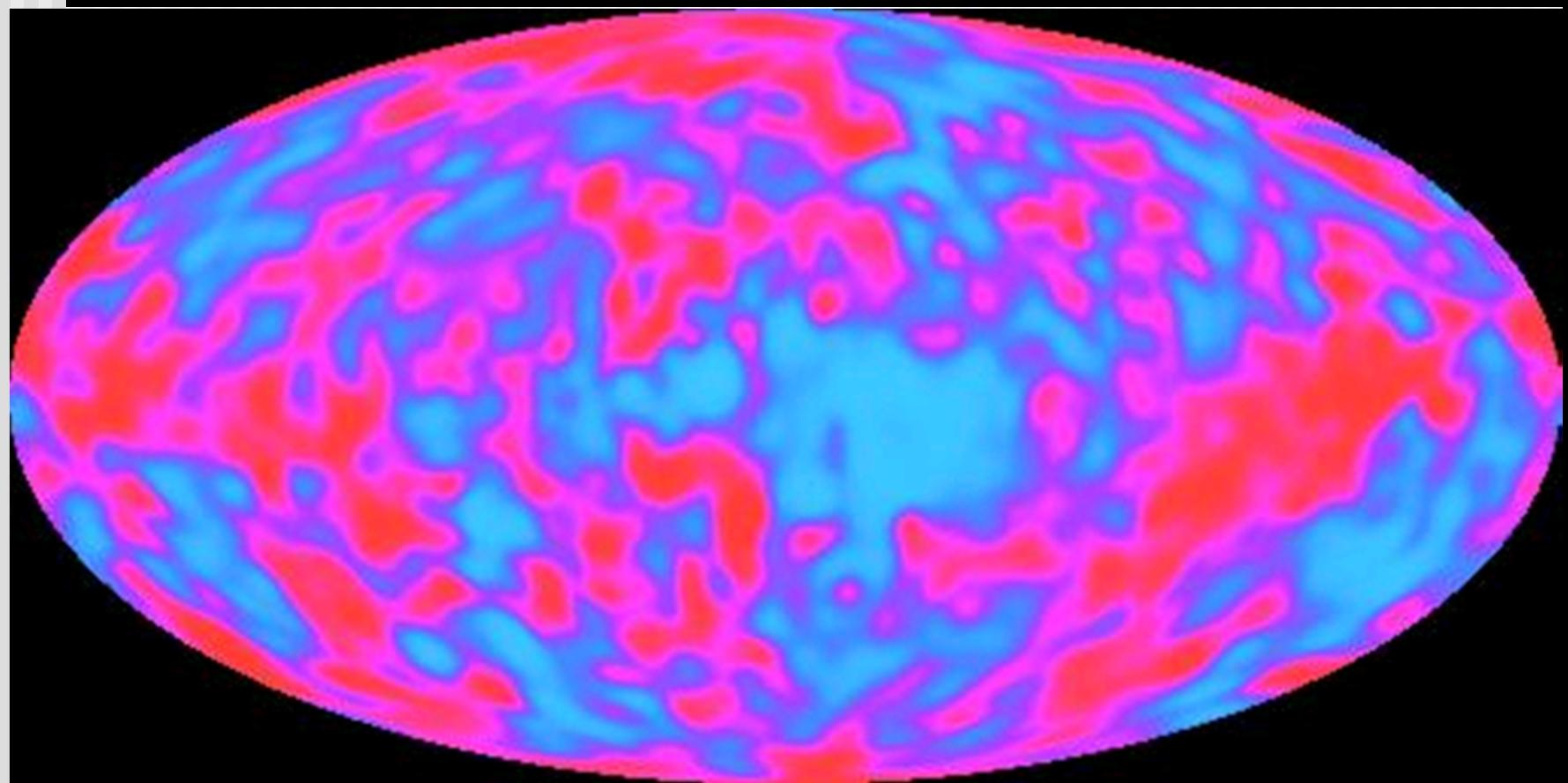
Hubble Space Telescope • Faint Object Spectrograph



1964, Arno Penzias ir Robert Wilson atrado mikrobangų fono spinduliuotę, 2.7°



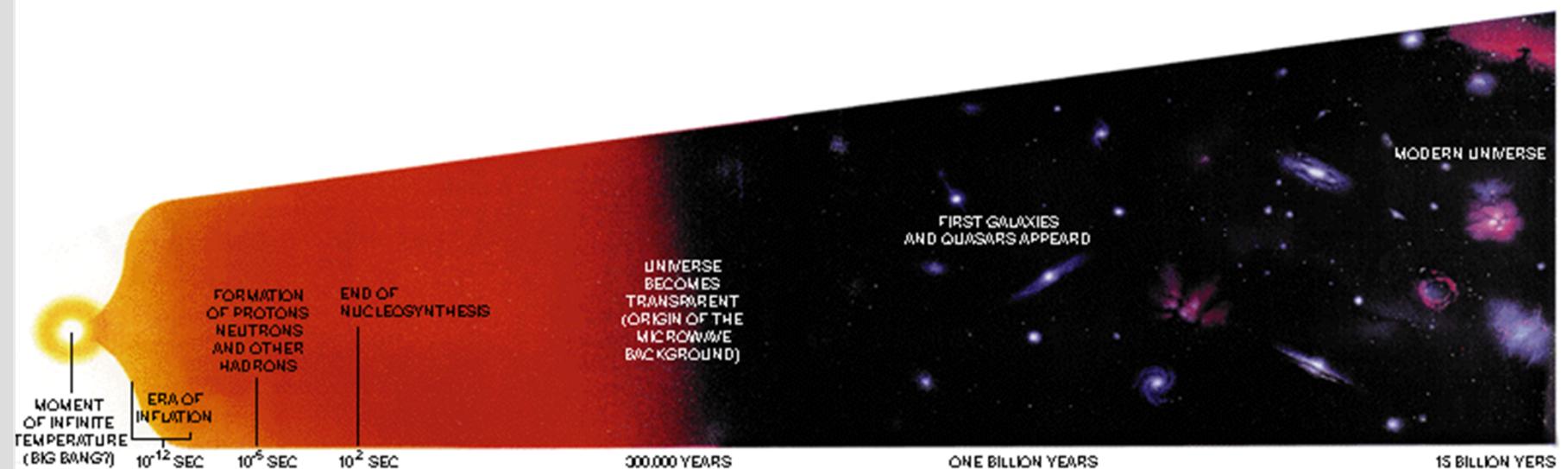
Cosmic Background Explorer (COBE) Dangaus žemėlapis

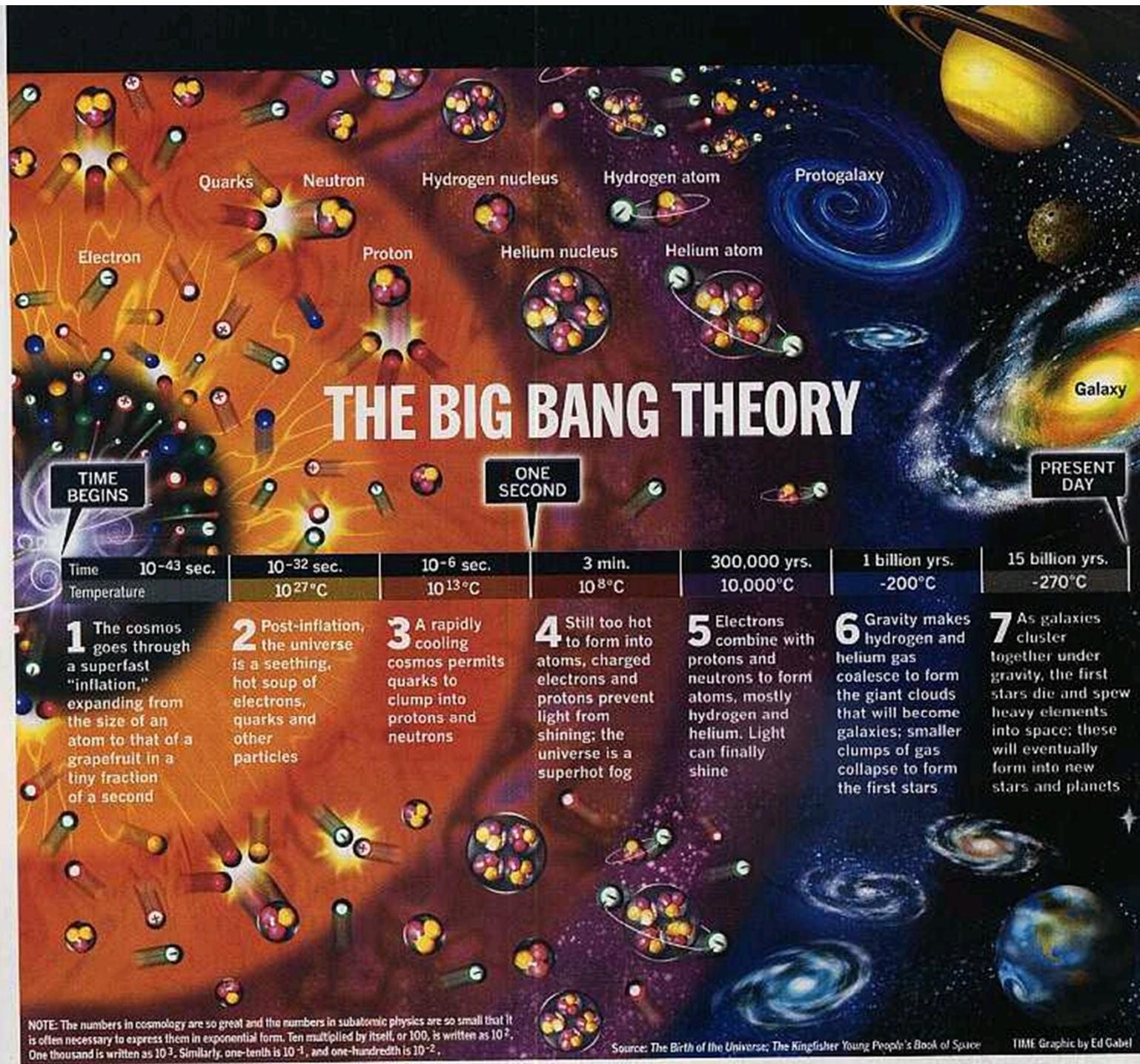


Mūsų visatos eros

Nr	Trukmė, s	Eros
	$0-10^{-44}$	Singuliarumo būsena
	$10^{-44}-10^{-7}$	Planko era
	$10^{-44}-10^{-34}$	Infliacijos era
	$10^{-7}-10^{-4}$	Hadronų era
	$10^{-4}-10$	Leptonų era
	$10-10^{10}$	Spindulių era
	10^{10} -iki dabar	Medžiagos

Didžiojo sprogimo scenarijus





Mikelandželo "Pasaulio sukūrimas"

Dievas atskyrė šviesą nuo tamsos



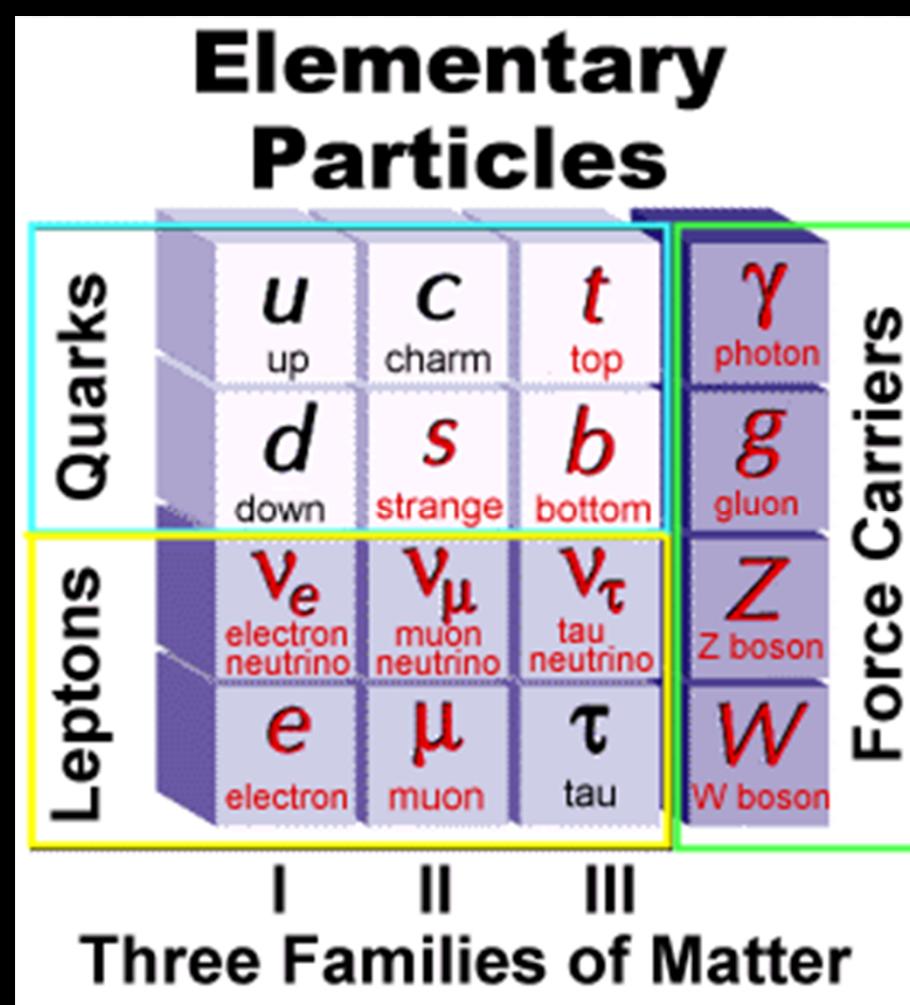
Dimensijų metoda

1899 Plankas

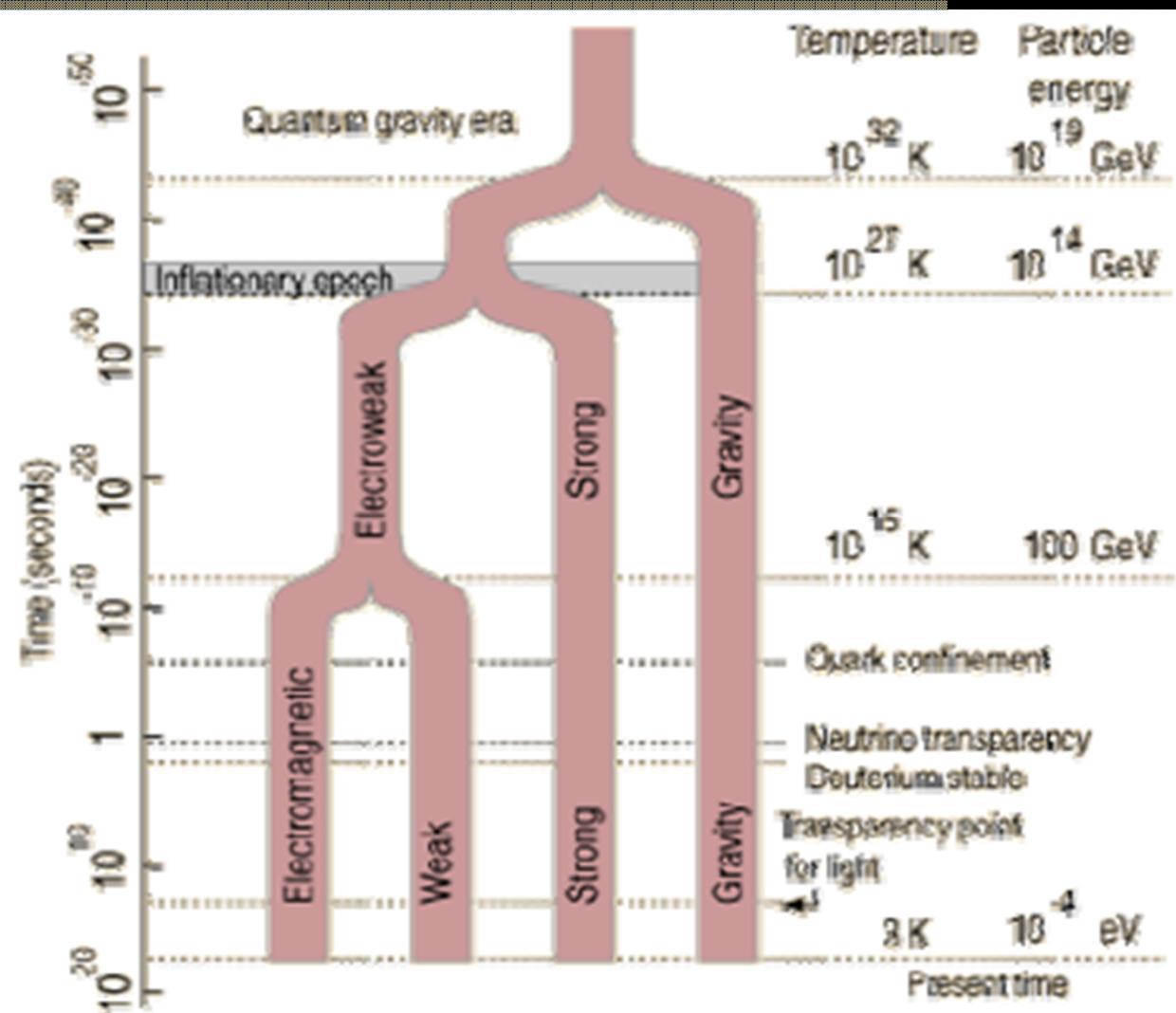
Grav
Plan
Švie



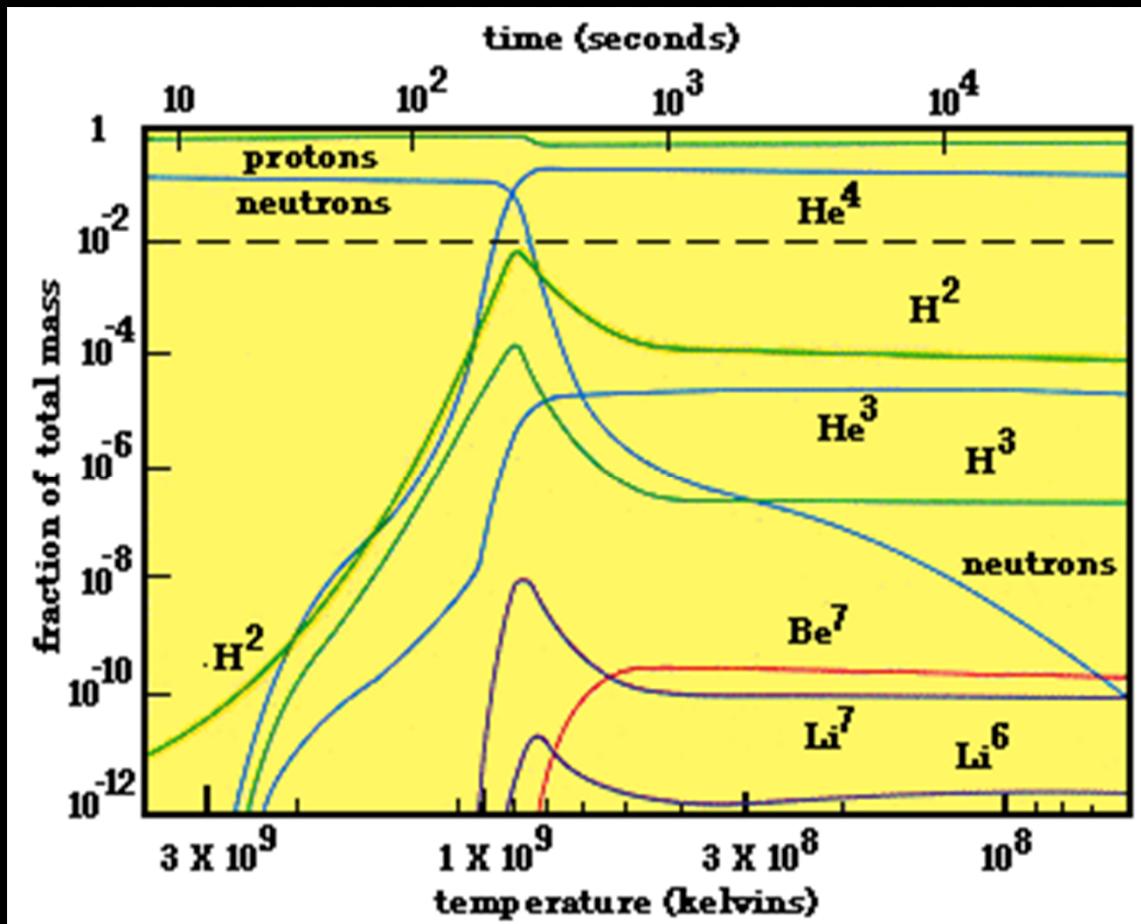
Standartinis elementariųjų dalelių modelis



Sąveikų dydžio priklausomybė nuo atstumo tarp dalelių



Cheminiai elementai atsiradė po BB



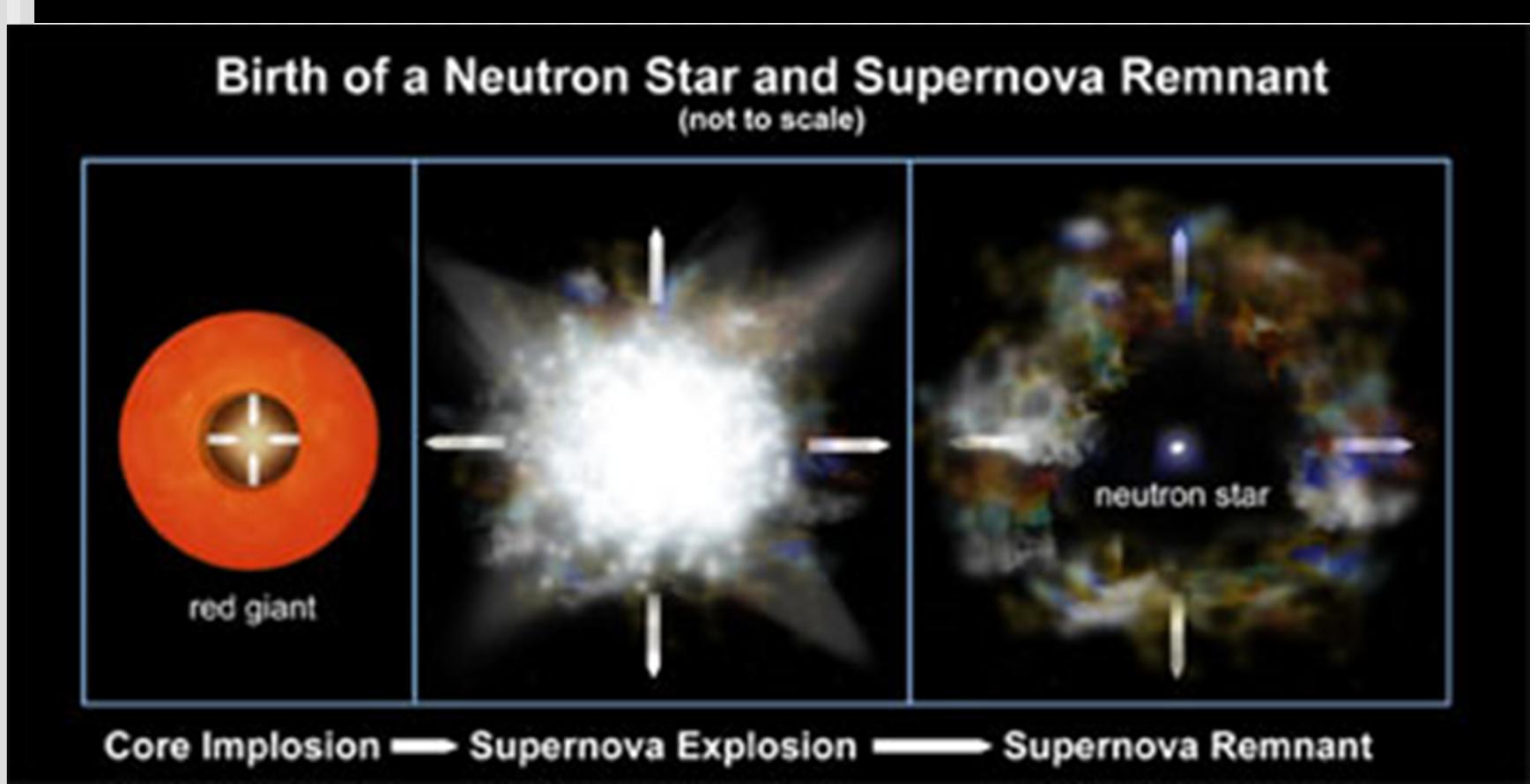
Spindulių eroje vyko cheminės reakcijos

2m

12% neutronų
88% protonų

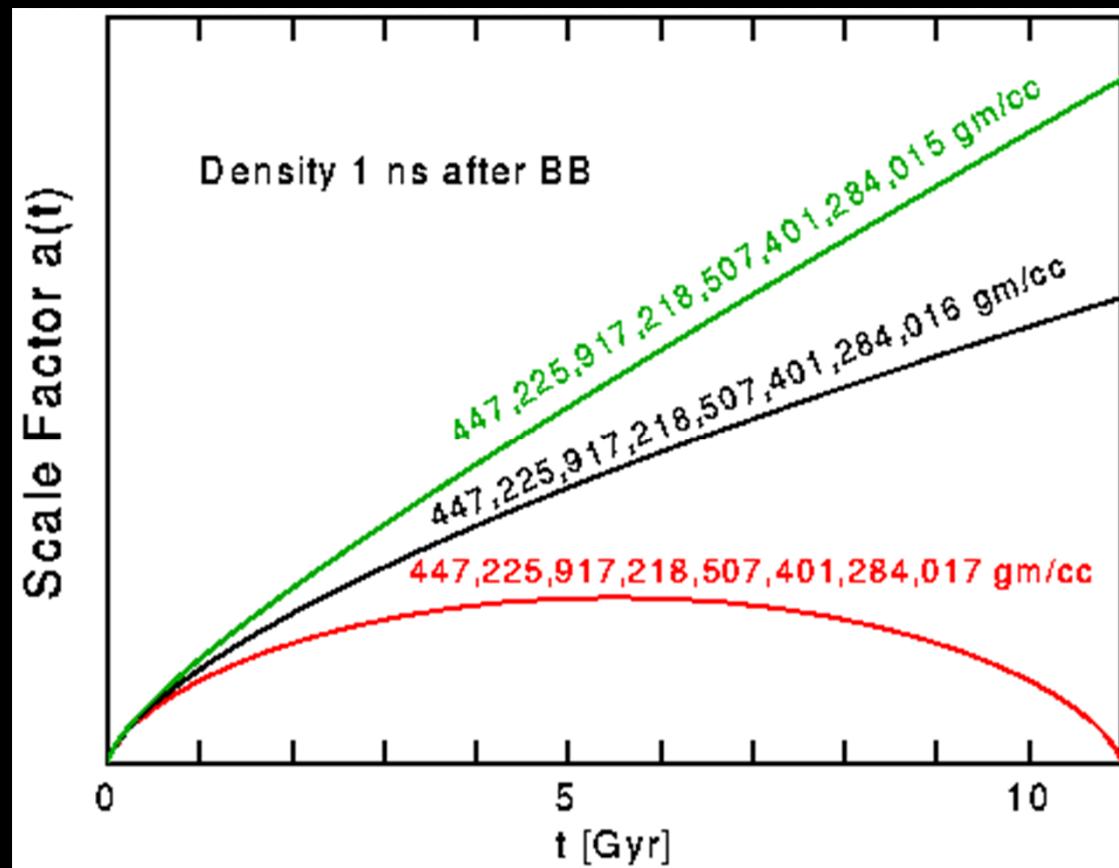
24% ${}^4\text{He}$
76% H

Kiti elementai susiformavo žvaigždėse, išdegus H ir He



Trys visatos evoliucijos modeliai

kritinis tankis = 447,225,917,218,507,401,284,016 gm/cc



Dark Matter & Dark Energy

Dark Matter is matter that emits or reflects minimal to no light, but does have a gravitational influence. Evidence for dark matter appears to be present in

- the motion of stars in galaxies.
- the orbits of galaxies in galaxy clusters.
- the temperature of intracluster gas in galaxy clusters.
- the gravitational lensing of distant galaxies.

Some possible types of dark matter include:

- Massive compact halo objects (MACHOS) – These are large objects, like brown dwarfs and Jupiter-sized planets, that exist in the halos of galaxies.
- Weakly interacting massive particles (WIMPS) – These are subatomic particles that have extremely small masses, but exist in great quantities. Neutrinos are an example of a such a particle.

Dark Energy is the term used for a possible unseen influence that may be causing the universal expansion to accelerate. Recent observations of supernovae have produced a value for an acceleration that implies a universe that is about 70% dark energy.

dark energy



forces

homogeneous

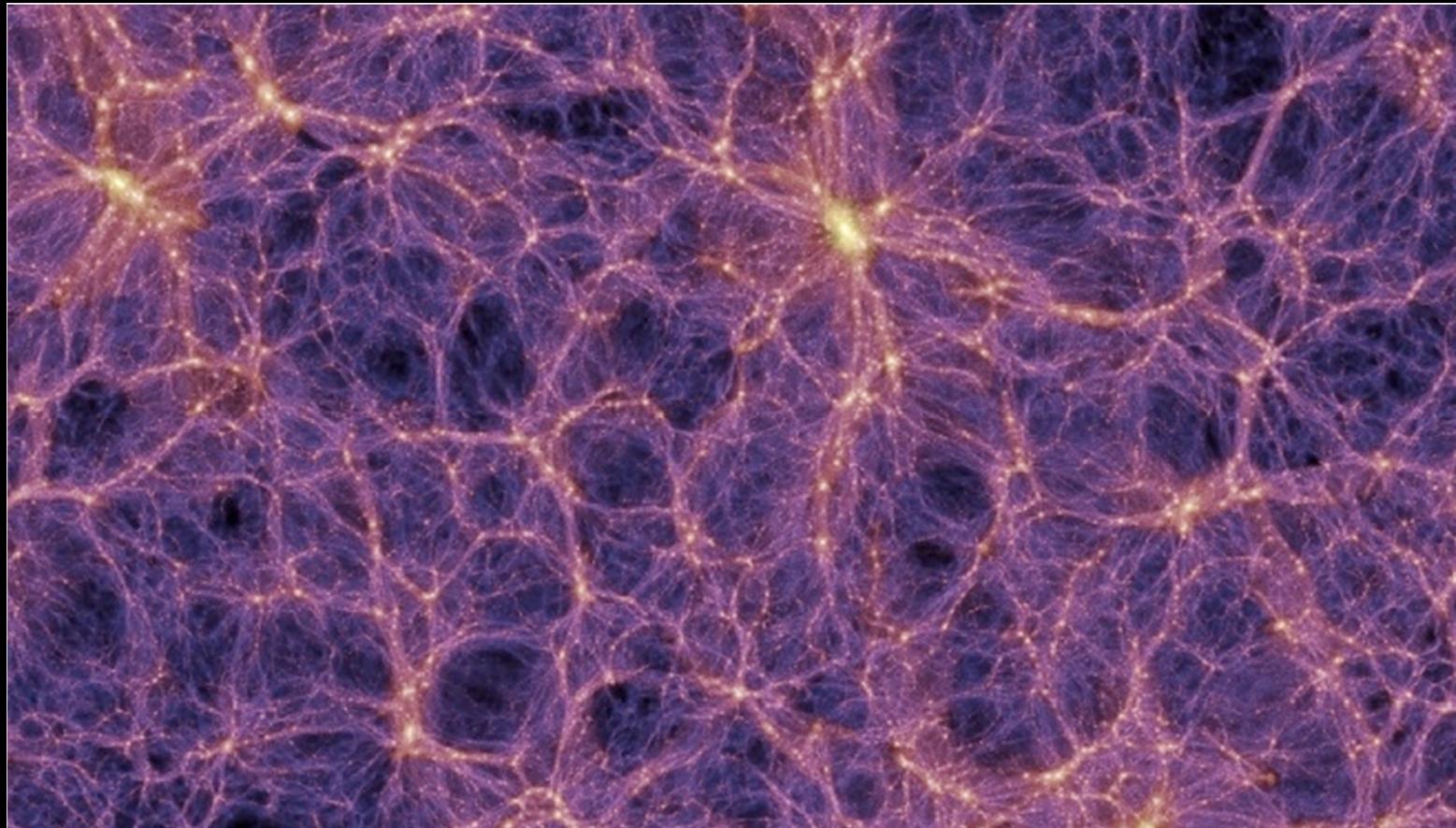
gravity

dense
fundamental

quintessence

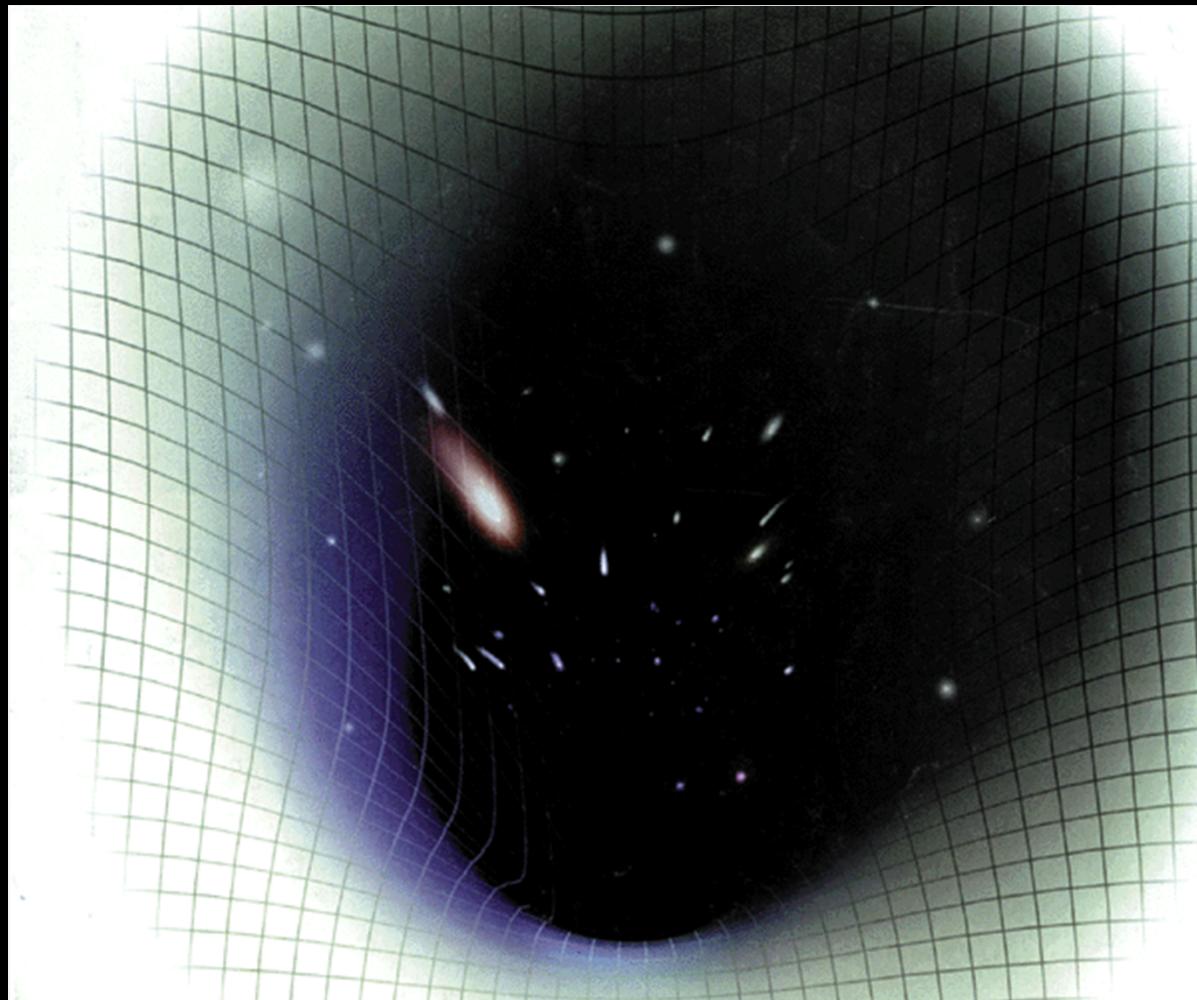
negative pressure

Tamsioji materija

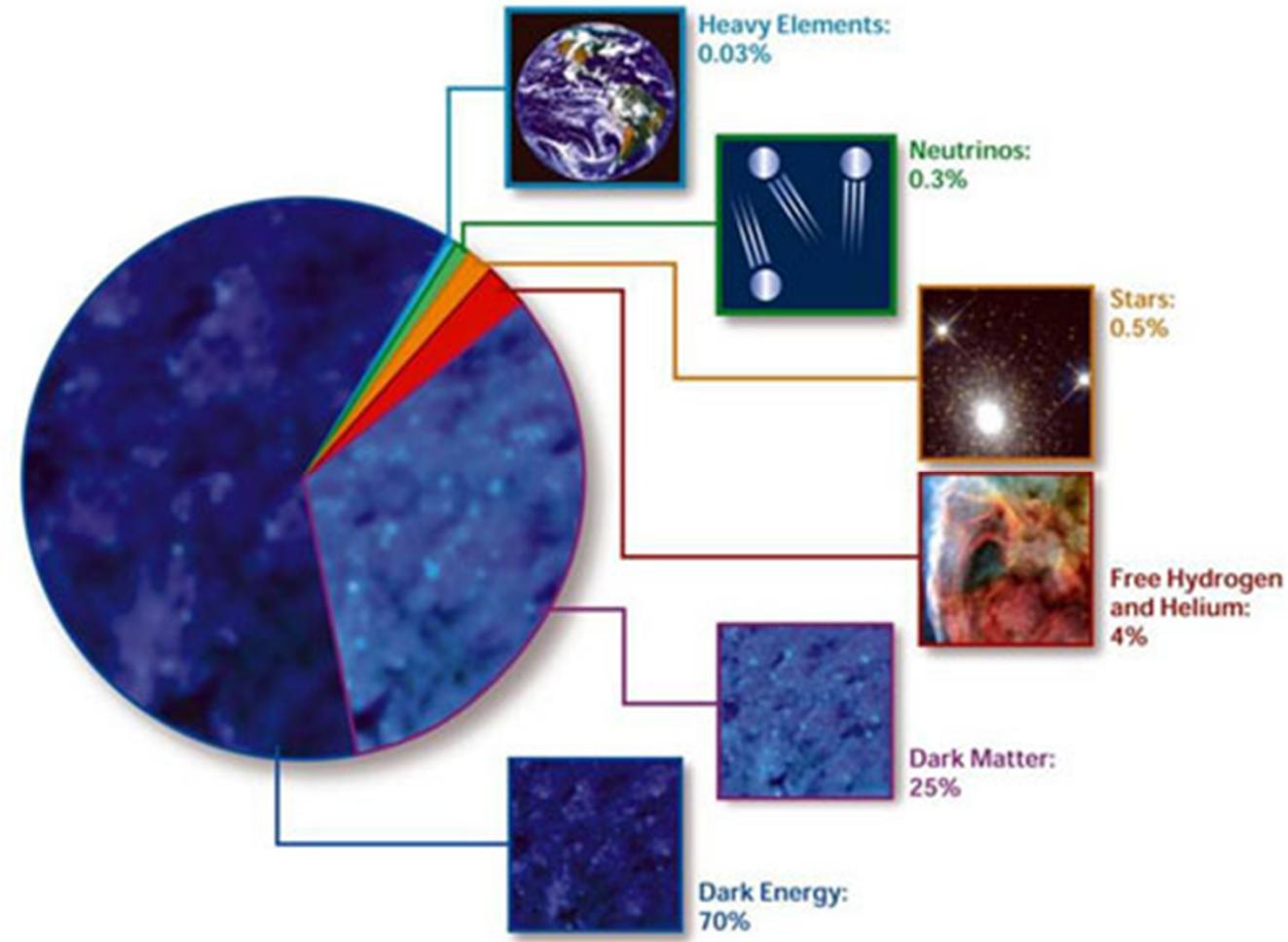


Juodoji skylė

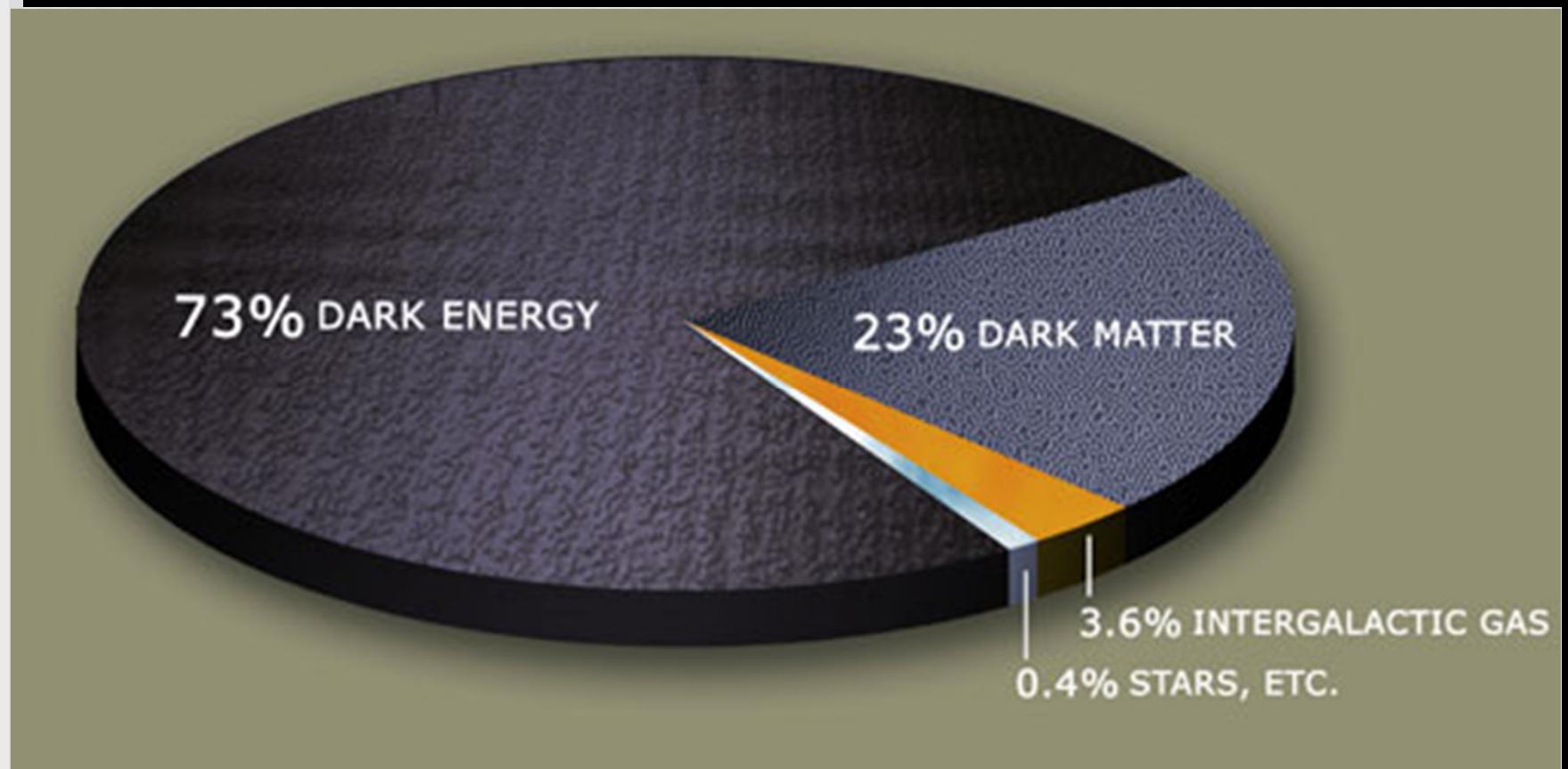
Juodosios bedugnės gravitacinis laukas iškraipo erdvėlaikio formą



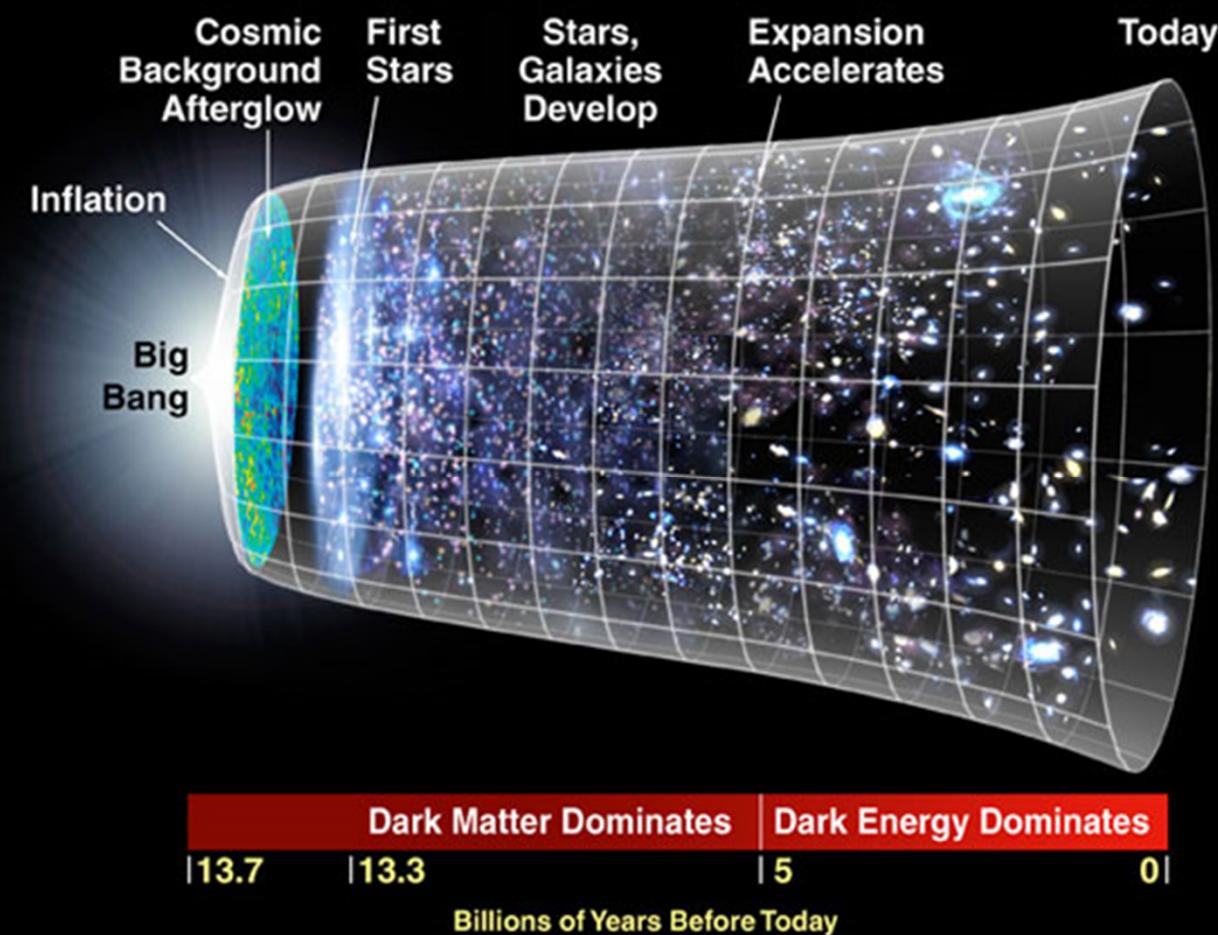
Visatos sandara



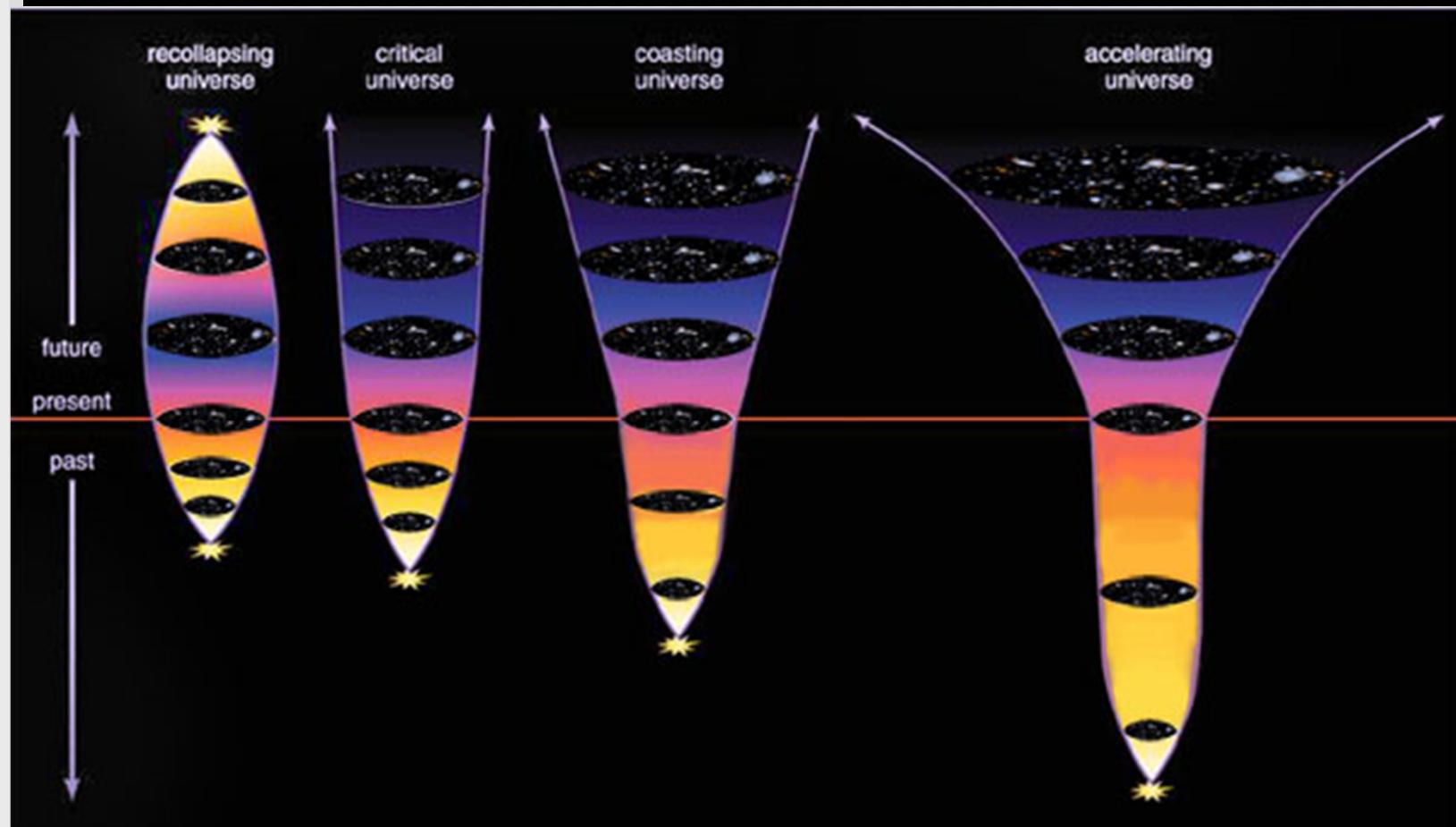
Tamsioji energija ir materija



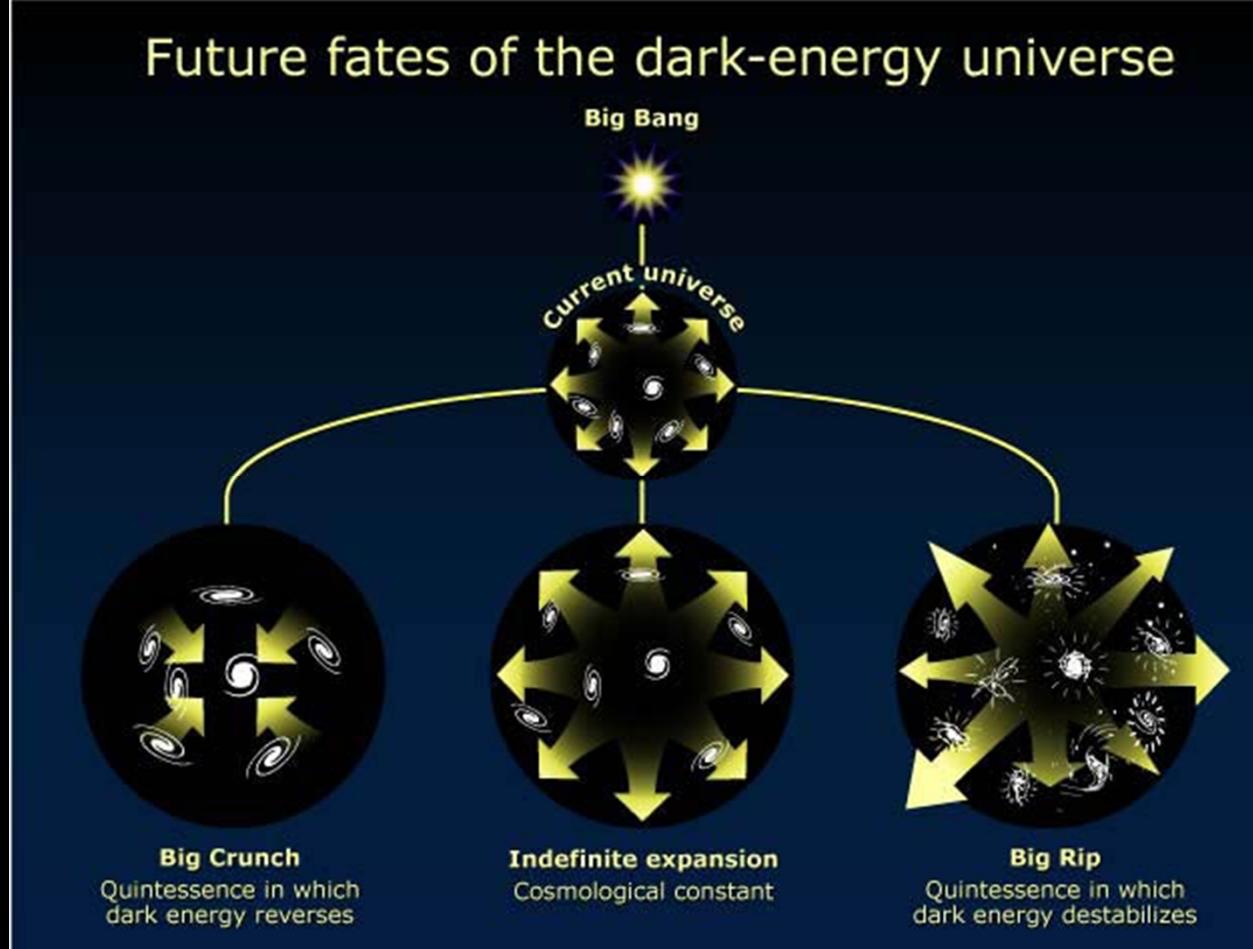
Besiplečianti visata



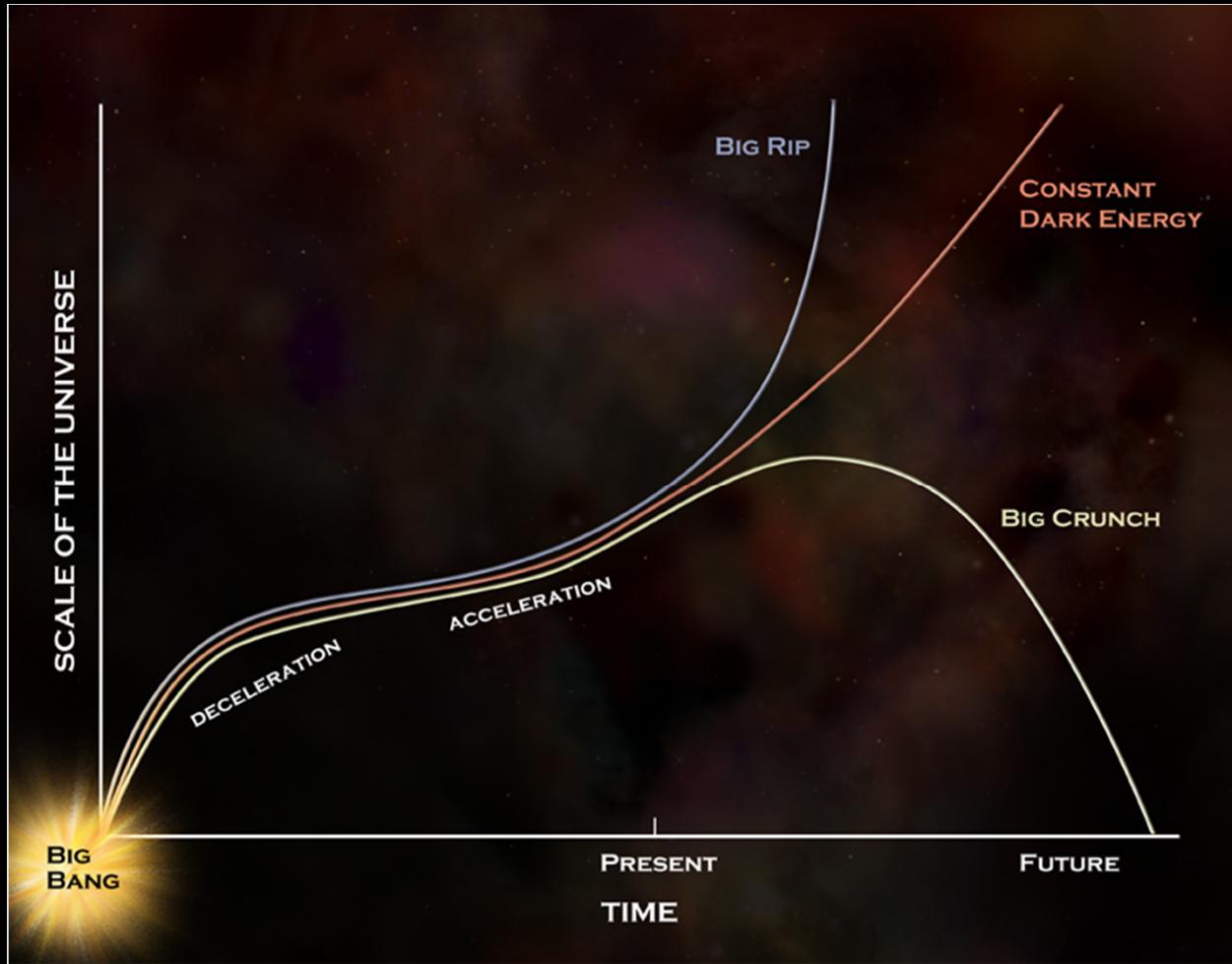
Tamsioji energija ir visatos likimas



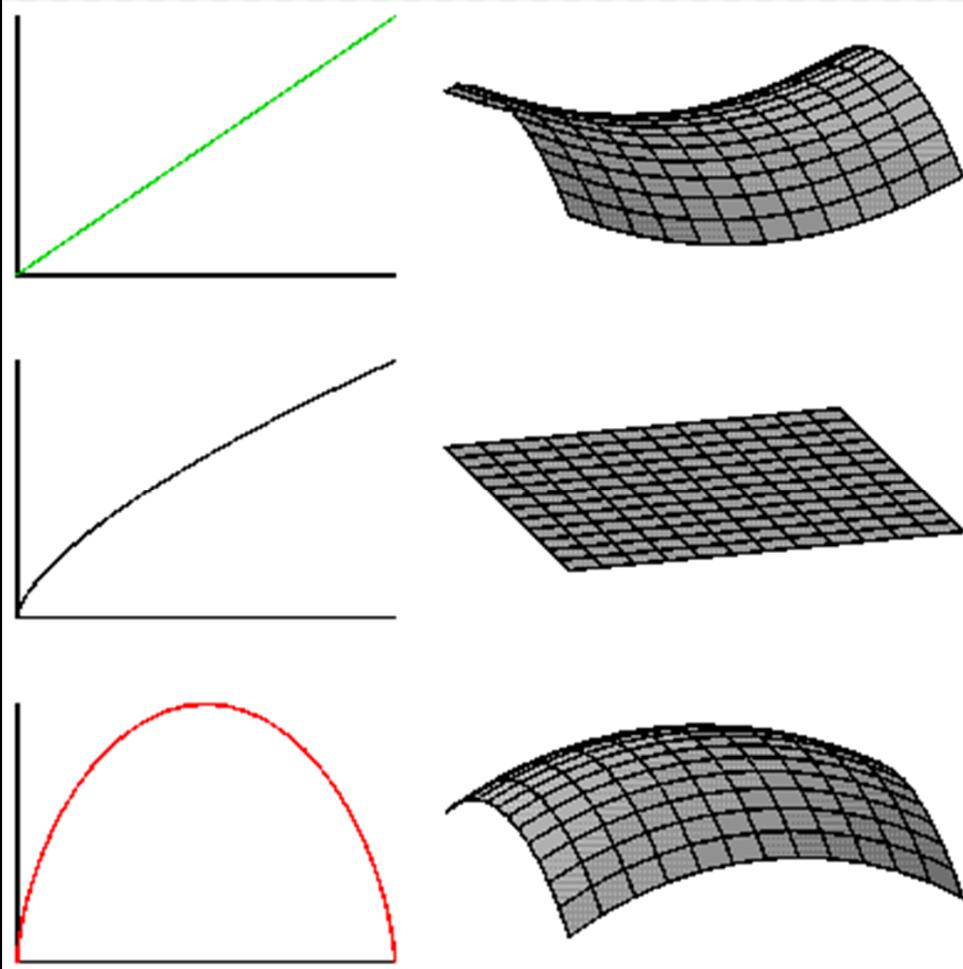
Visatos likimas



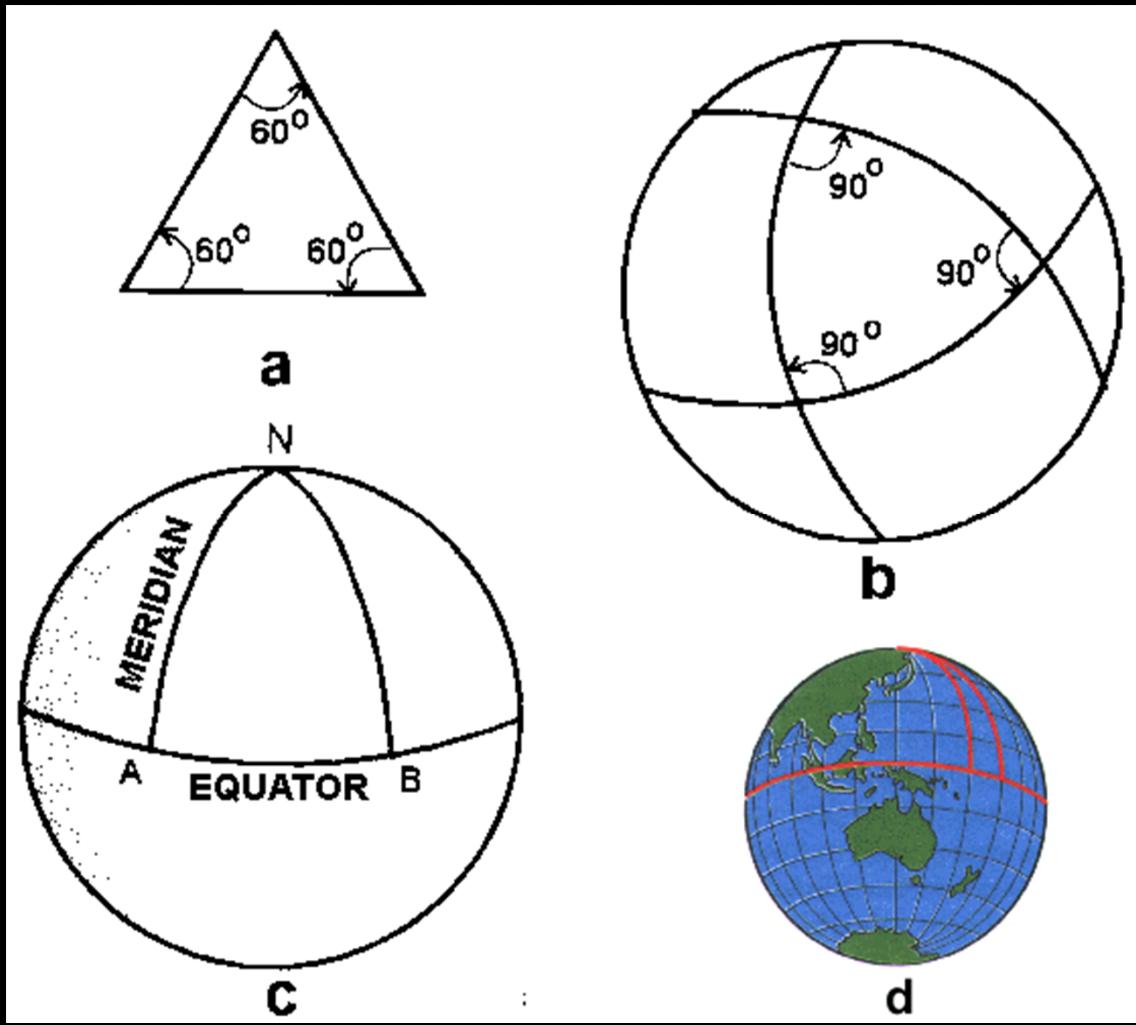
Visatos likimas



Plokštumo problema



Euklido ir Rymano geometrija



M.C. Ešerio
"Miobjaus juosta"



Laiko kryptis

WEYL CURVATURE HYPOTHESIS

The universe just after the big bang has a small Weyl curvature, whereas near the end of time it has a large Weyl curvature.

Penrose suggests that this curvature, therefore, accounts for the direction in which the arrow of time points.



Žemė



M.C. Ešerio "Piešiančios rankos"

