1/3 Էլեմենտար Մասնիկների Ֆիզիկա

2/3 Կոսմոլոգիա

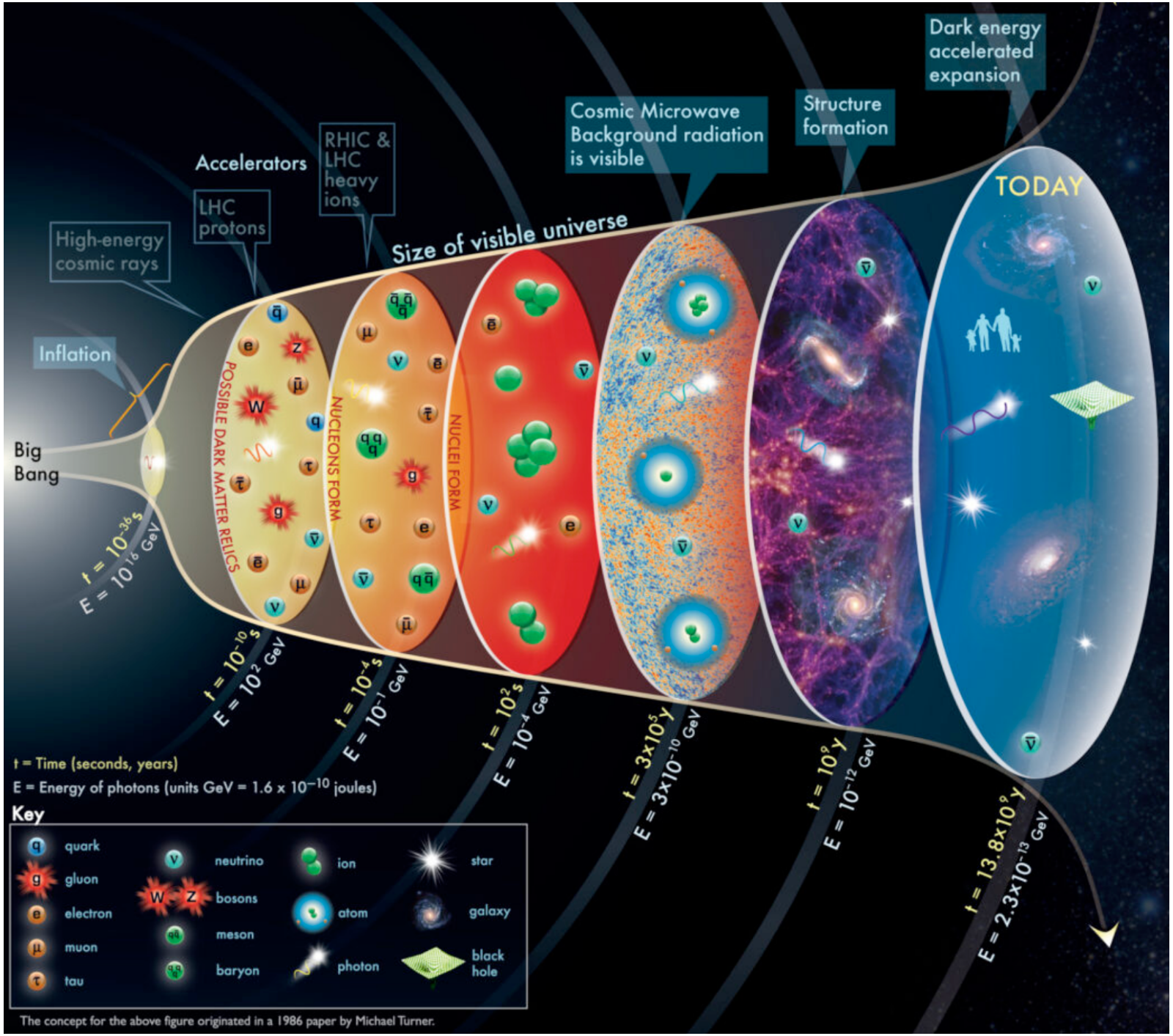
3/3 Նեյտրինային Ֆիզիկա

Իոաննիսյան Արա

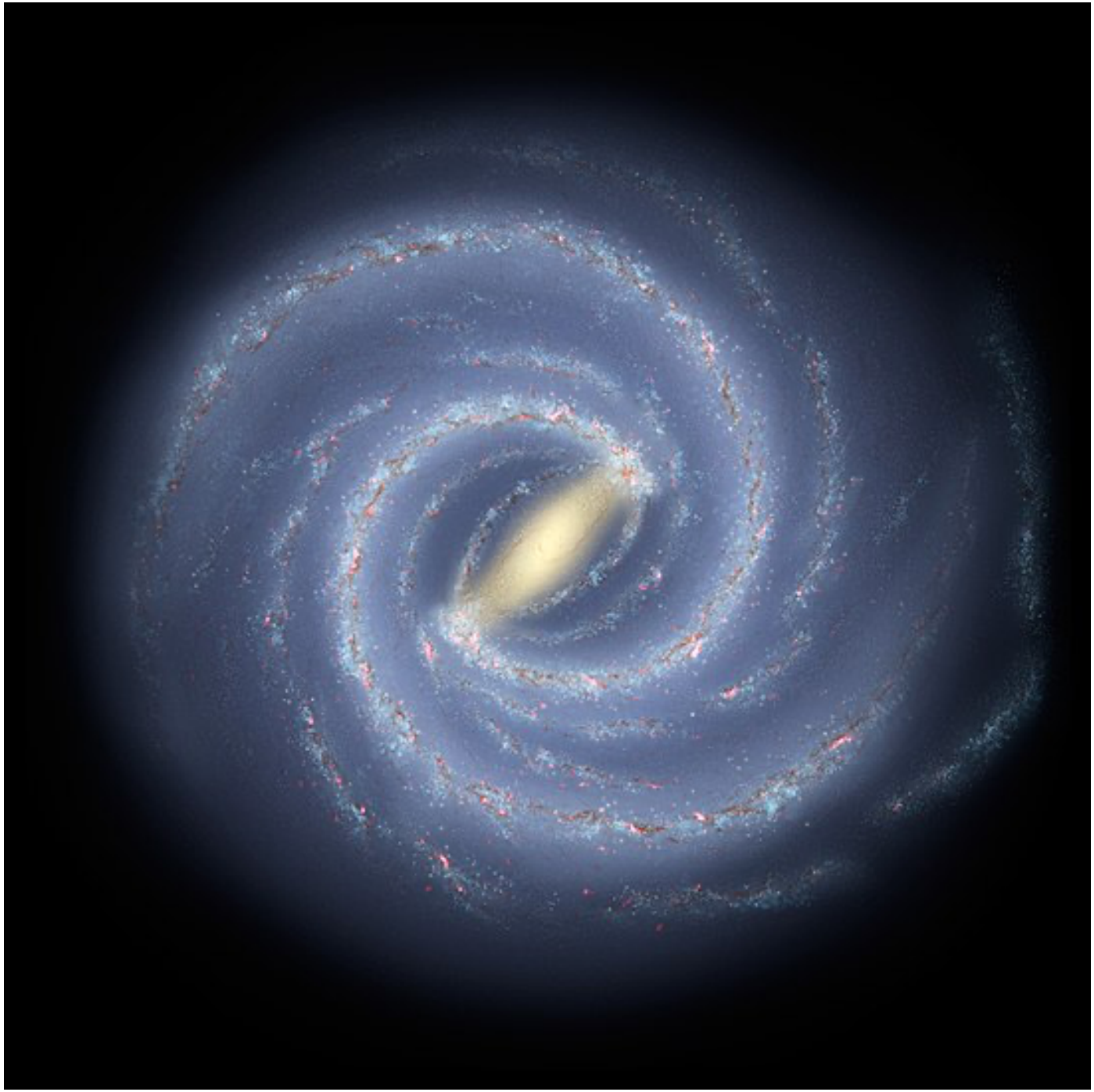
Armenian Teacher Programme CERN24

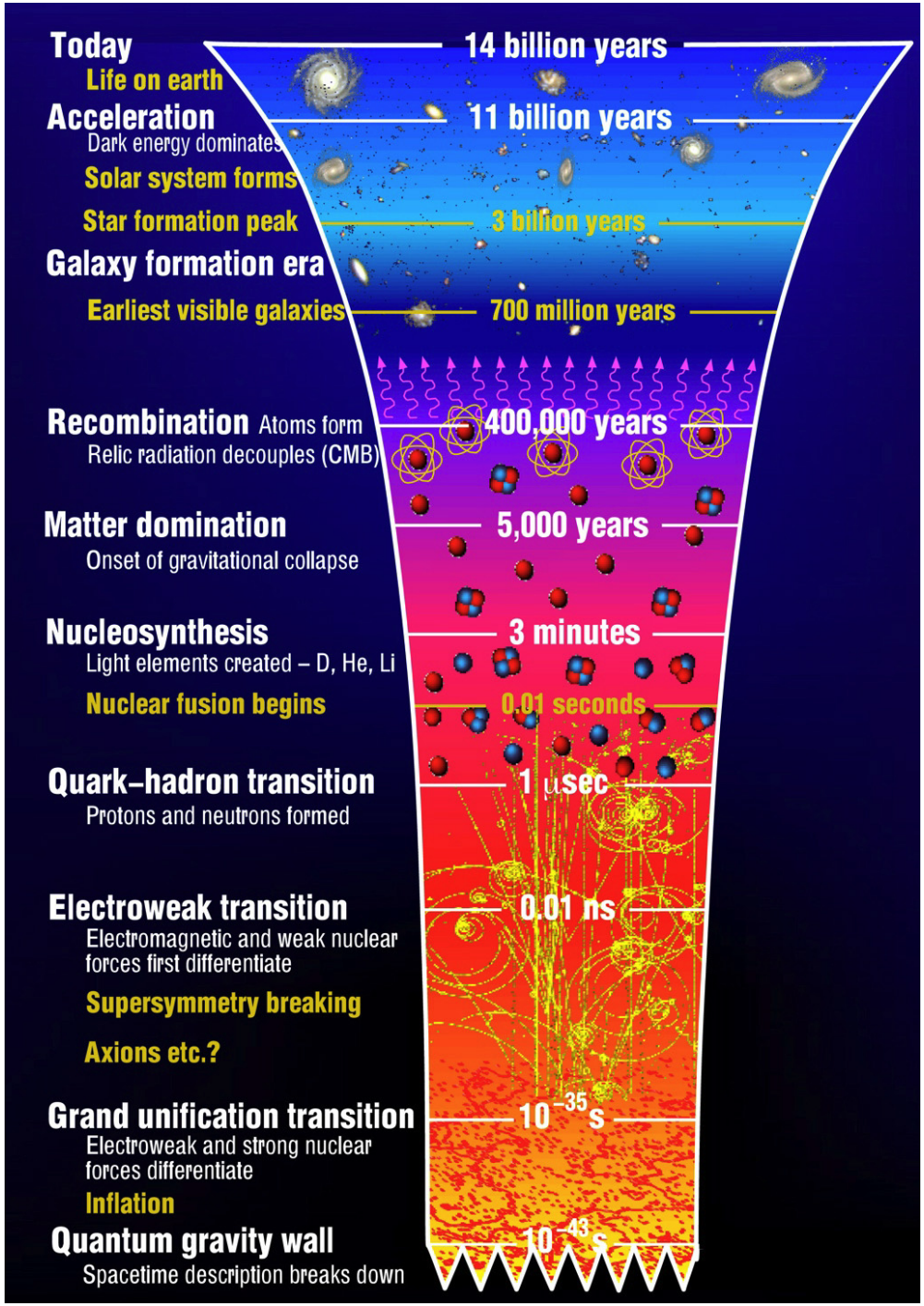
Հայաստանի Ֆիզիկայի Ուսուցիչներ CERN24

2/3 Կոսմոլոգիա



The concept for the above figure originated in a 1986 paper by Michael Turner.




Today
14 billion years
Life on earth
Acceleration
11 billion years
Dark energy dominates
Solar system forms
Star formation peak
3 billion years
Galaxy formation era
Earliest visible galaxies
700 million years
Recombination Atoms form
Relic radiation decouples (CMB)
400,000 years
Matter domination
Onset of gravitational collapse
5,000 years
Nucleosynthesis
Light elements created – D, He, Li
3 minutes
Nuclear fusion begins
0.01 seconds
Quark–hadron transition
Protons and neutrons formed
1 μsec
Electroweak transition
Electromagnetic and weak nuclear forces first differentiate
0.01 ns
Supersymmetry breaking
Axions etc.?
Grand unification transition
Electroweak and strong nuclear forces differentiate
10 −35 s
Inflation
Quantum gravity wall
Spacetime description breaks down
10 −43 s

Էինշտեյն

$R_{\mu\nu} - 1/2\ R\ g_{\mu\nu} + \Lambda\ g_{\mu\nu} = 8\pi G/c^4\ T_{\mu\nu}$

Ֆրիդման

$\rho_c = 3\ H^2/8\pi G = 8.5\ 10^{-27}\ kg/m^3$

$\rho = \rho_c$

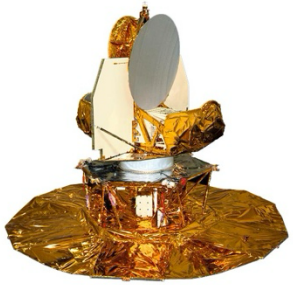
$\rho = \rho_m + \rho_{dm} + \rho_{de}$

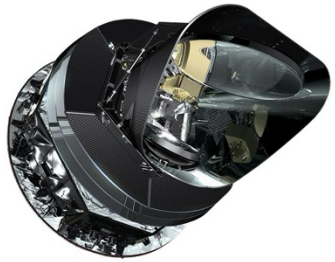
4.9%+27%+68.1%

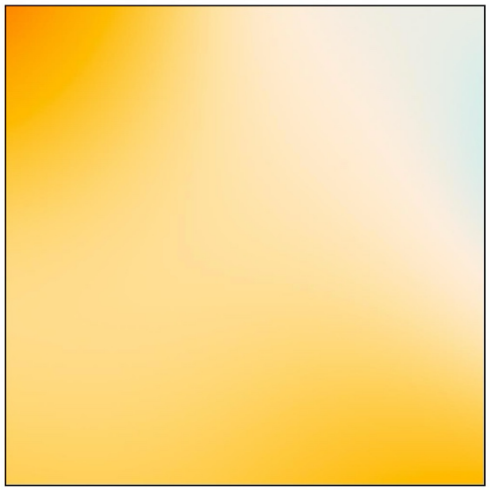
$t^{1/2}$ Radiation dominant

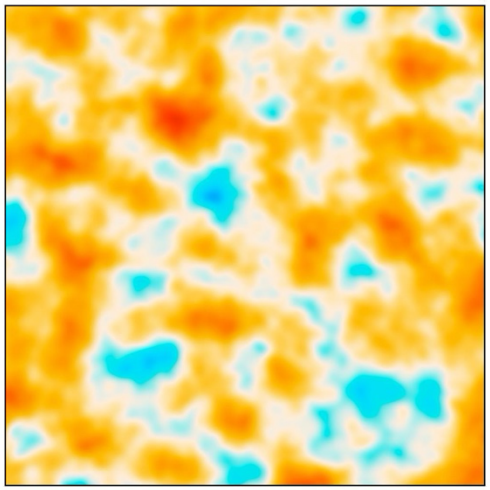
$t^{2/3}$ matter dominant

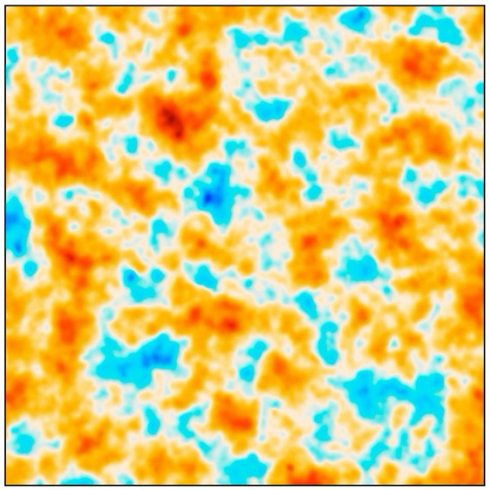
Exp(t). cosmology constant dominant







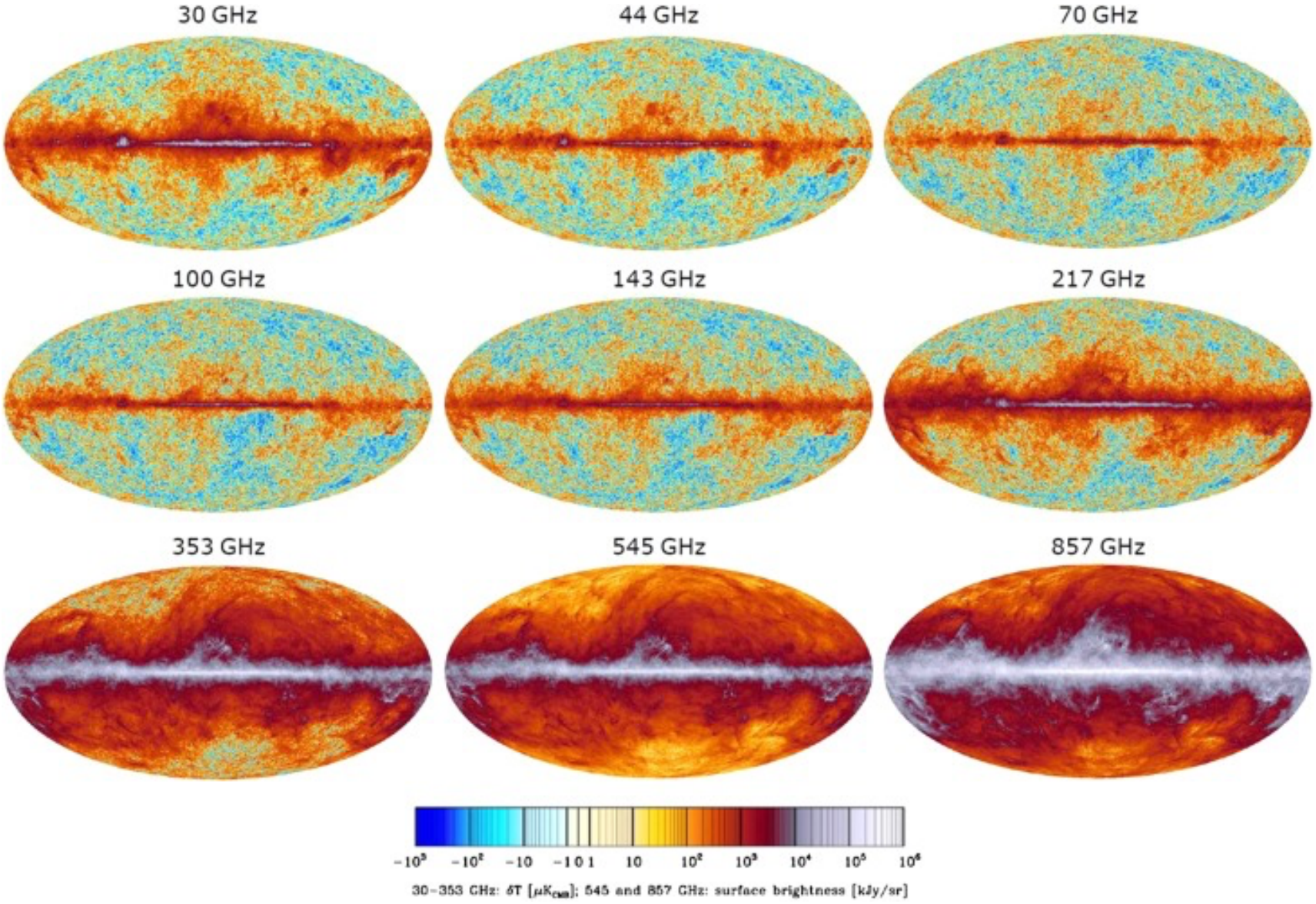


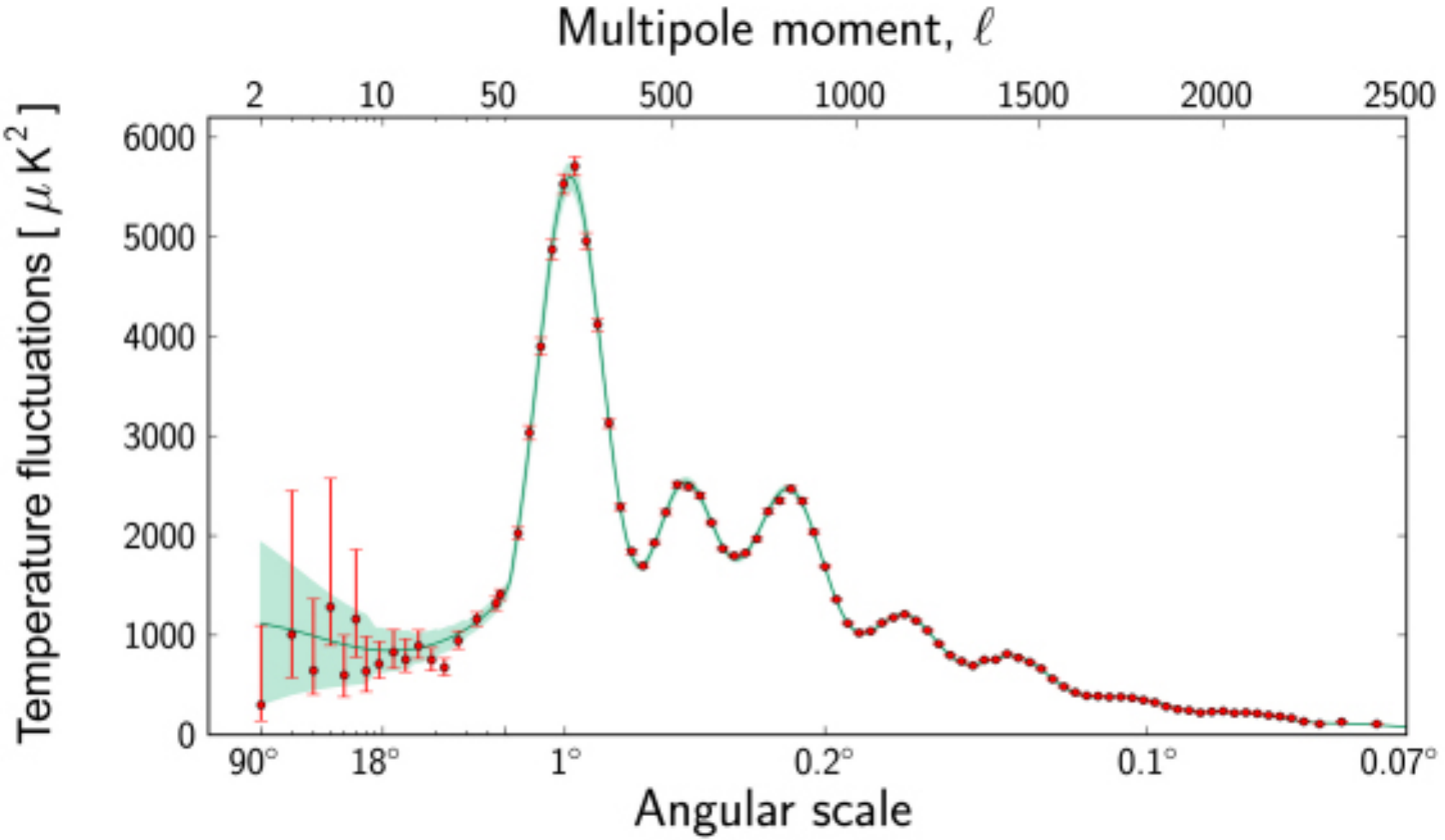


COBE

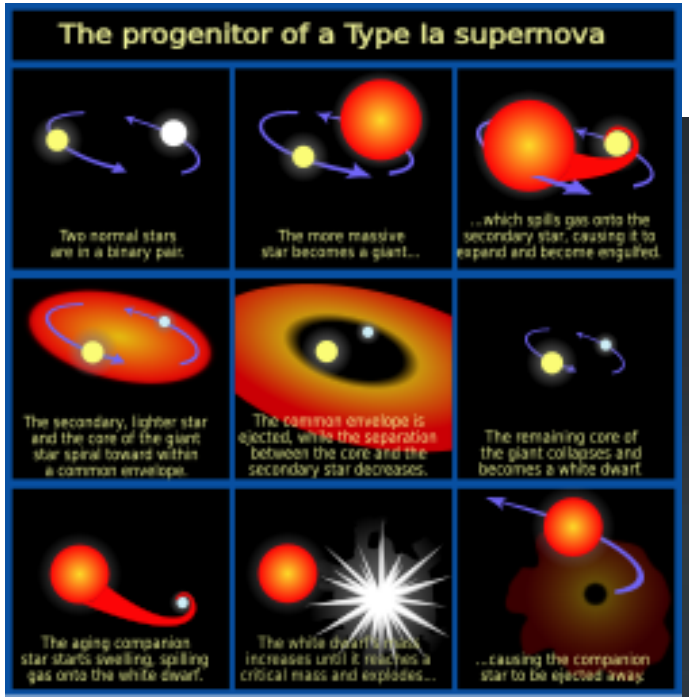
WMAP

Planck


30 GHz
44 GHz
70 GHz
100 GHz
143 GHz
217 GHz
353 GHz
545 GHz
857 GHz
-10^3 -10^2 -10 -1 0 1 10 10^2 10^3 10^4 10^5 10^6
30–353 GHz: δT [μK_{CMB}]; 545 and 857 GHz: surface brightness [kJy/sr]


Multipole moment, ℓ
2
10
50
500
1000
1500
2000
2500
Temperature fluctuations [μ K^2]
6000
5000
4000
3000
2000
1000
0
90°
18°
1°
0.2°
0.1°
0.07°
Angular scale

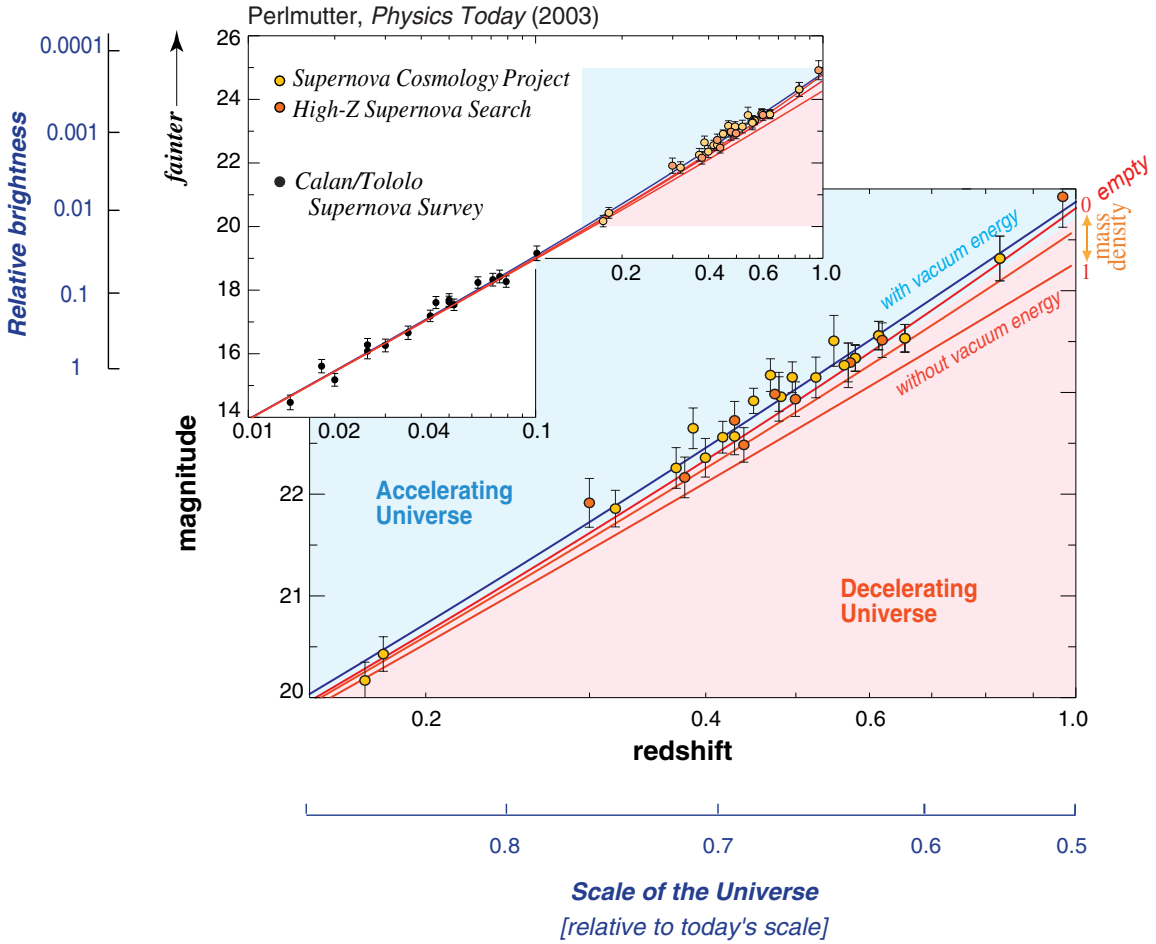
Planck



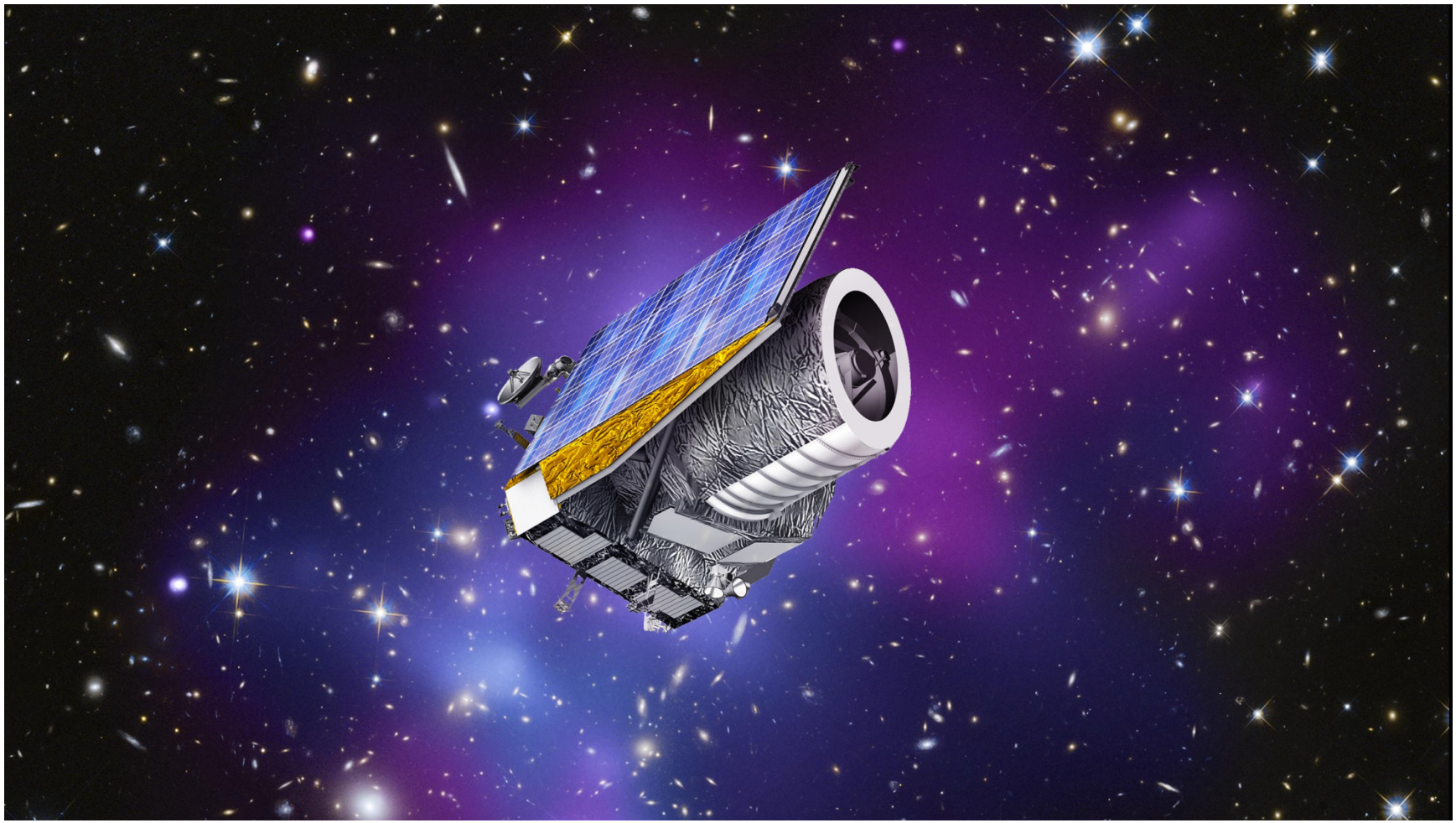
Supenova 1a

Չանդրասեկար.

Type Ia Supernovae

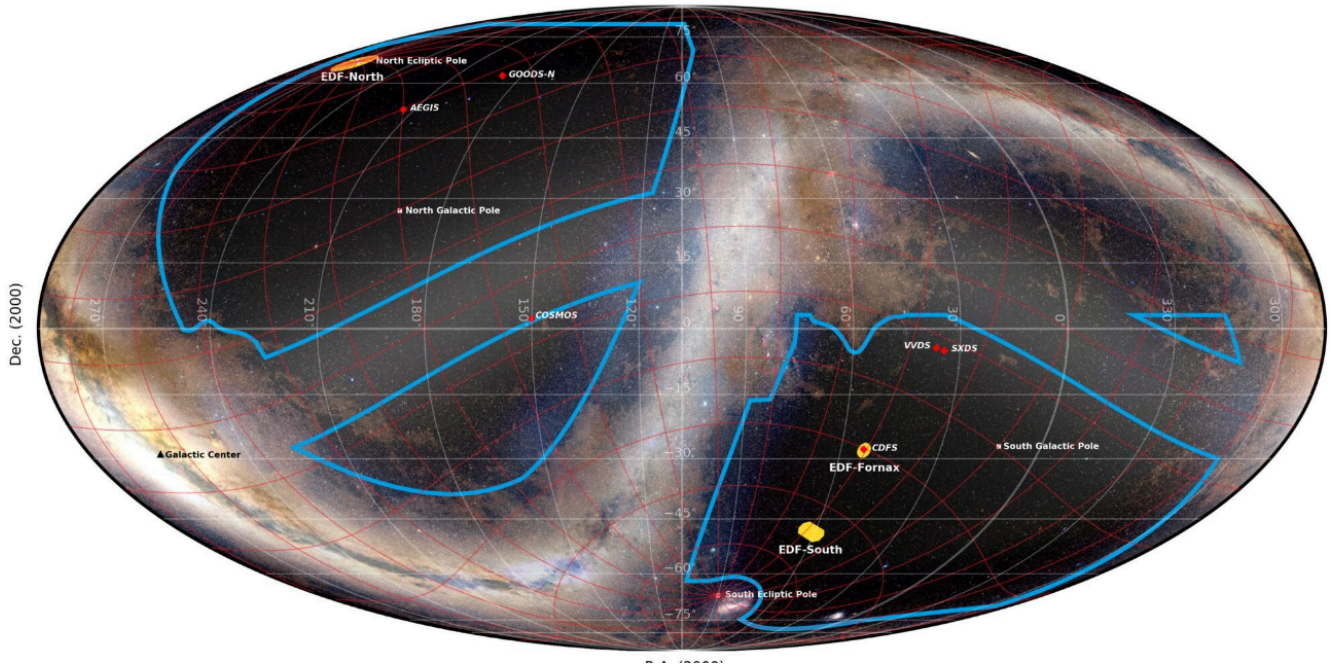


Euclid since 2023



The Euclid Deep Survey

For the Wide Survey, Euclid will observe each patch on the sky only once, with a footprint of 0.57 square degrees, about 3x the surface of the full moon, about every hour. For a much smaller area of 53 square degrees, however, Euclid will observe much longer, 40-53x longer than in the Wide Survey. This deep survey will allow to calibrate many aspects of the mission, and will later be used for a lot of legacy science projects.



208 GP

Շնորհակալություն

Հարցե՝ր