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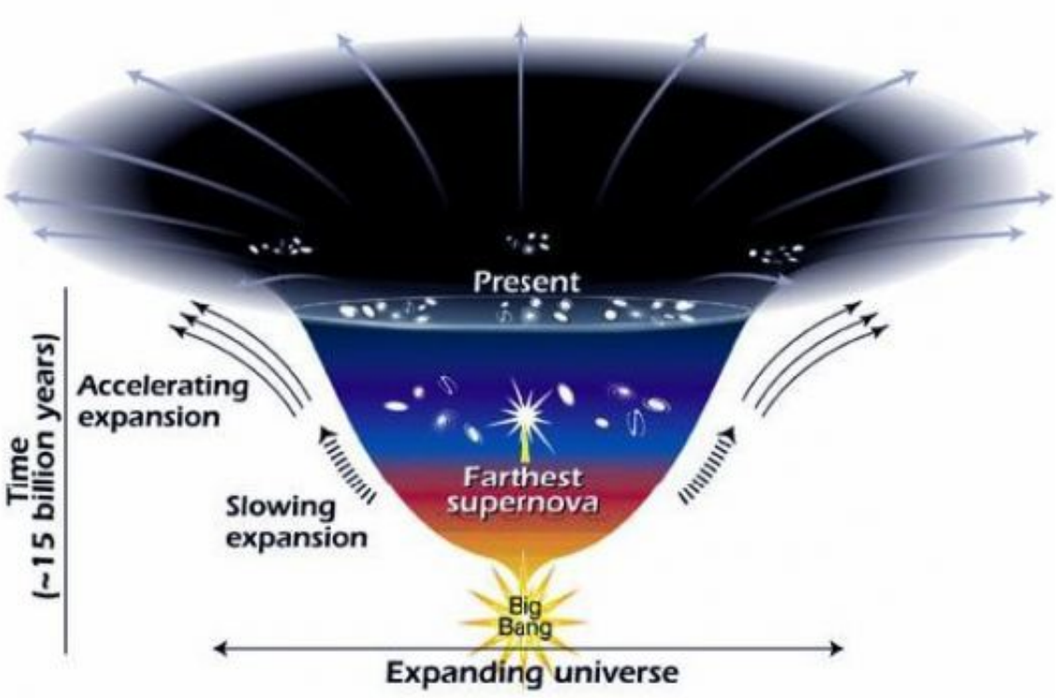
Author : ??.?????????

Date : July 29, 2012



This diagram reveals changes in the rate of expansion since the universe's birth 15 billion years ago. The more shallow the curve, the faster the rate of expansion. The curve changes noticeably about 7.5 billion years ago, when objects in the universe began flying apart at a faster rate. Astronomers theorize that the faster expansion rate is due to a mysterious, dark force that is pushing galaxies apart.

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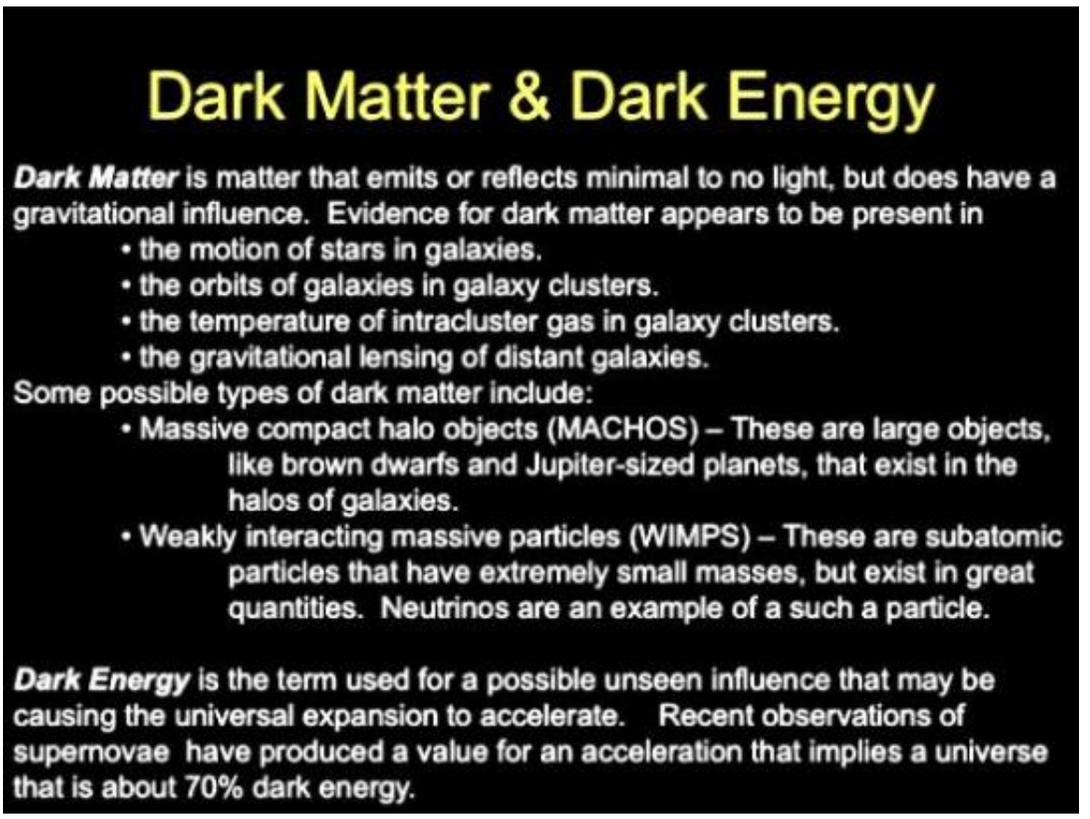

1998 ????????? ???????? “??????? ?????” ??????? ??? ????????? ??????? ?????? ???????????? ?????? ! ??????? ????? ?????? ??????????? ??????? ???????? (Gravity) ???

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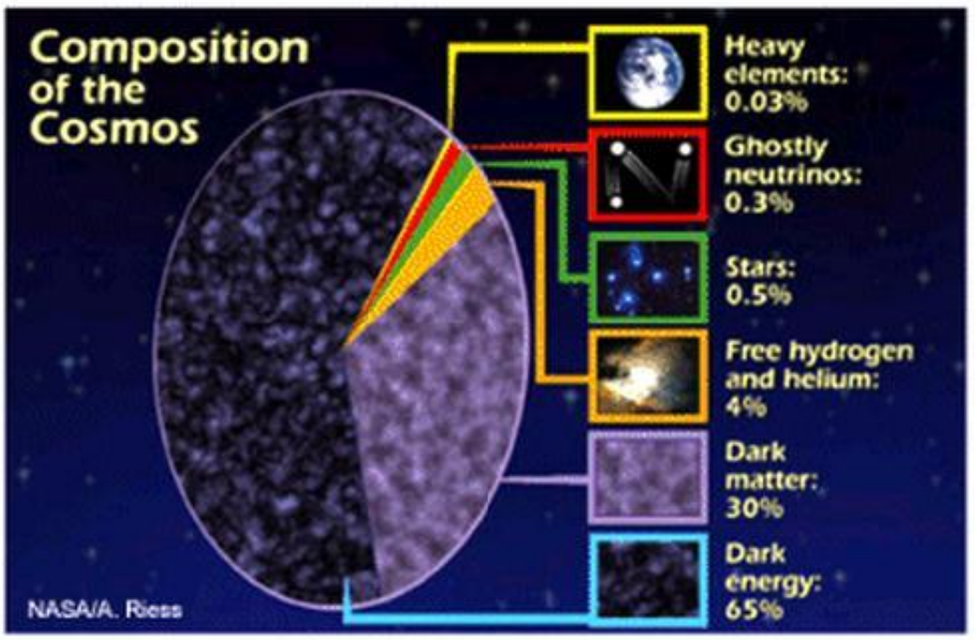

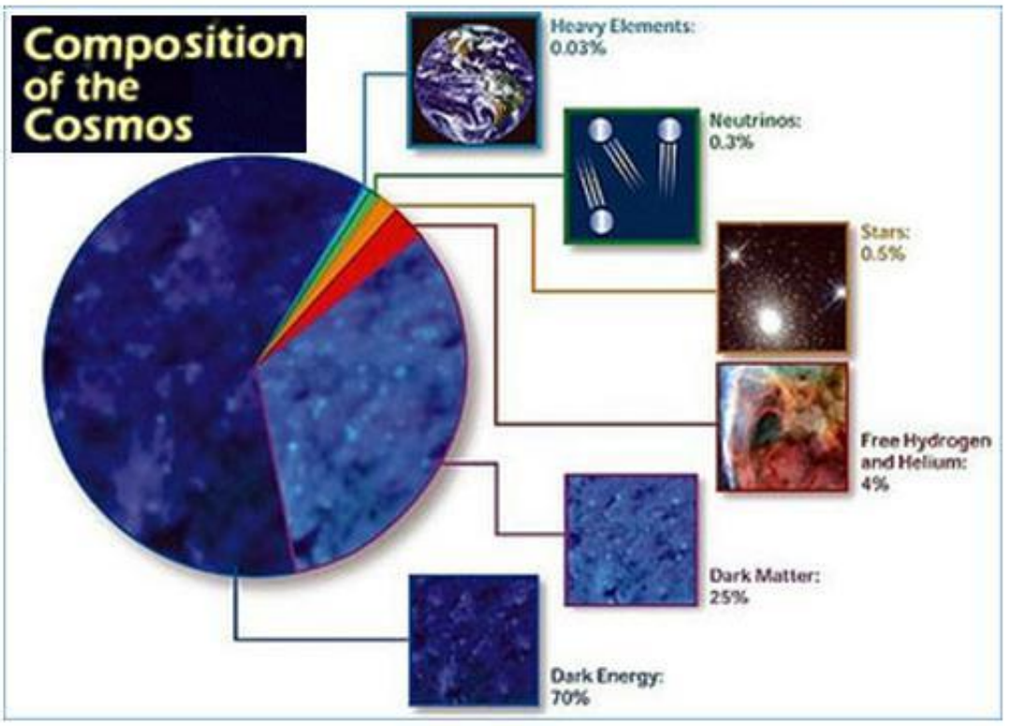

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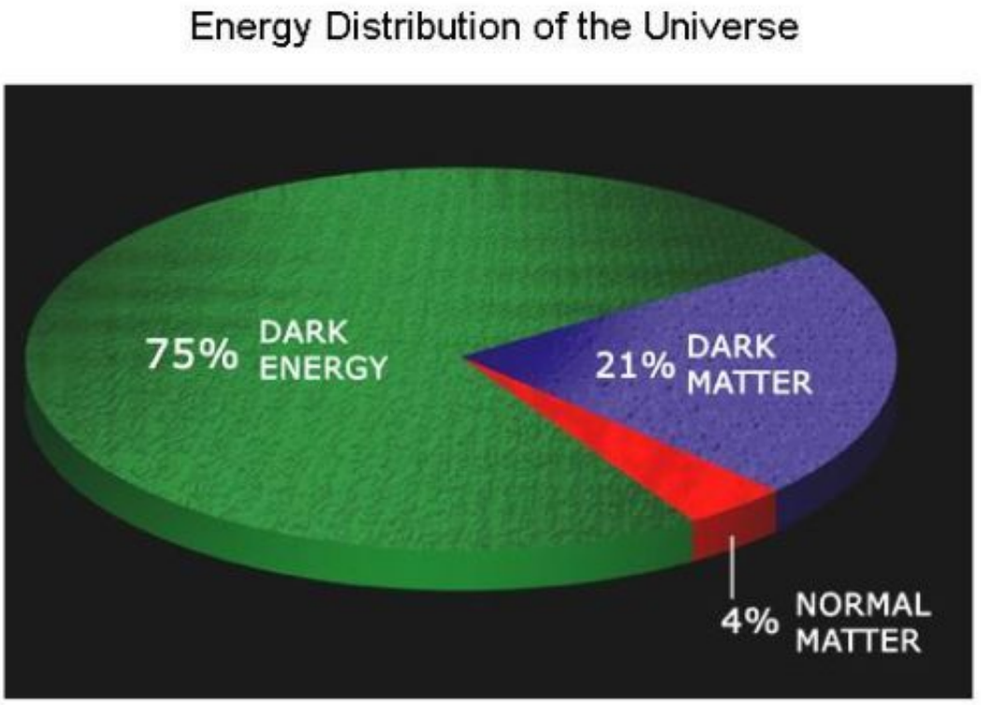
1998 ??? ??????? ?????? ??????? ?????????? [Hubble Space Telescope] ????????? ???? ???????????????[Supernovae]?? ????? ????????? ?????????? ! ?????? ??????????? ??????? ??????? ????????????? ???????? ????? ????? ?????? ?????? ????????? ; ??????? ??????? ?????? ???????? ???? ???????? ????? ???? ??? ????? ???????? !



The new Chandra observations include estimates of the total energy content of the Universe. As shown in this illustration, dark energy is estimated to contribute about 75% of the energy in the Universe, dark matter about 21% and normal matter about 4%. Only the normal matter can be directly detected with telescopes, and about 85% of this is hot, intergalactic gas, as detected in Chandra observations of galaxy clusters.

(Credit: NASA/CXC/M.Weiss)

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1. “????????? ??????? ???????” [Cosmological Constant] ????? ???????? ???? ???????? ????????? ????? ?????? ????????????? ????????? ?????????? ????? [Einstein's Theory of Gravity]. ???? ?????? ????????????? ????????????? ????????? ???????.

2. ??????????? ????????? ??? ??? “????? ???? ???? ???” [Energy Fluid] ?????????? ??????? ???????.

3. ????????? ????????? ????? ?????? ??????????. ??????? ?????? ????????? ???? ????? ???????? ??????.

??? [Dark Energy] ????? ???????????? ?????????.

????????????? ?????????? ??? ?????? [Cosmic Doomsday]

???? [Maya Forecast] ???? ??????? ?????? ???????????? ????????? ???? ????? 2012 ??? ??????????????????????????????????.??????????????????????????,???????????????????? ????? ??????? ??????? ???????? ???????? ????????? [using MZ Parameterization] ?????? ?????????? ????????? ????????? ?????????????.

??????????, ????????????, ????????? [Dark **Energy, Dark Matter, Black Hole]** ???? ???????? ??????? ???????????? ????????? ??????????? [Properties of Space] ????? ??????????????????. ???????? ?????? ????? ??????? ??????? ???????????? ????? ????????????? ?????????? ???????? ?????????. ??? ???????? ????????? ??????????? ??. ??????????????????????????????? ????????????? 70% ???????? ??????????? ????????????. ??????? ????????? ??????

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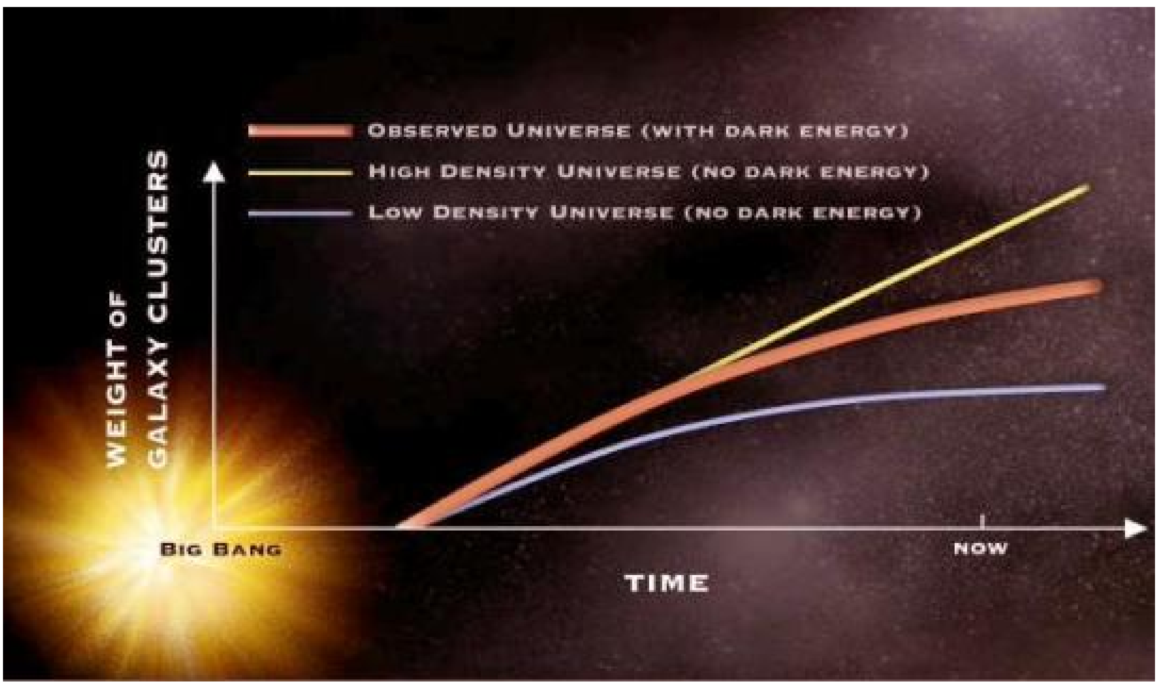

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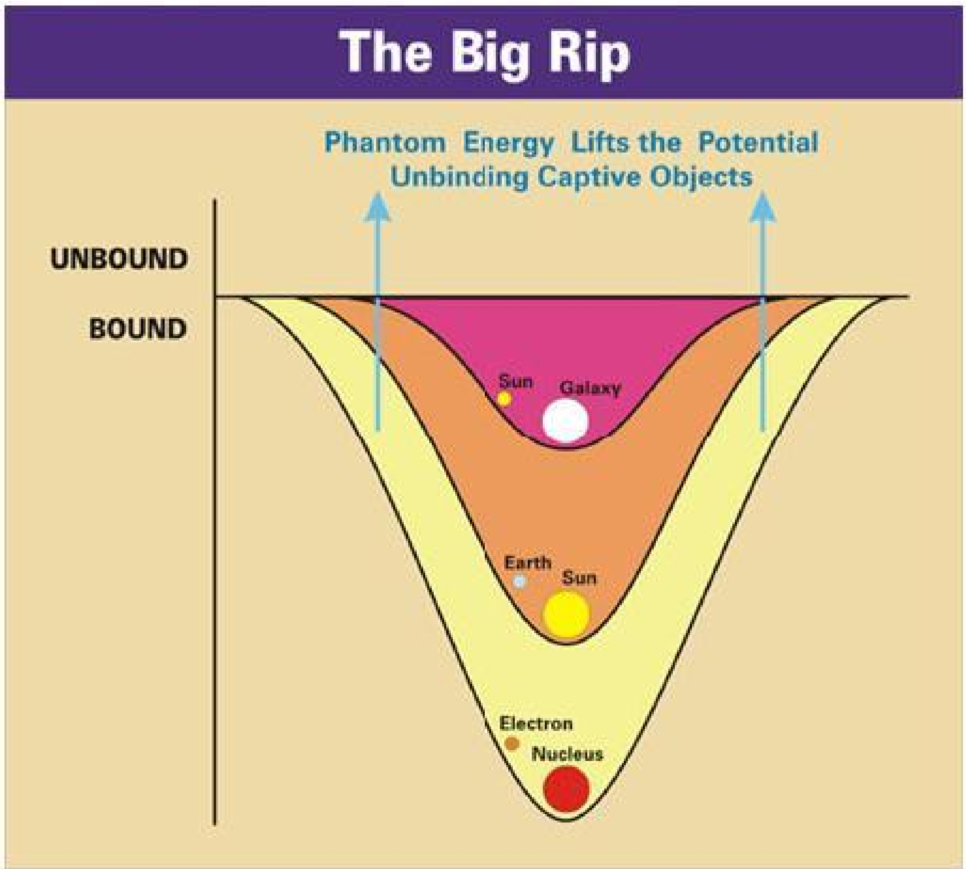
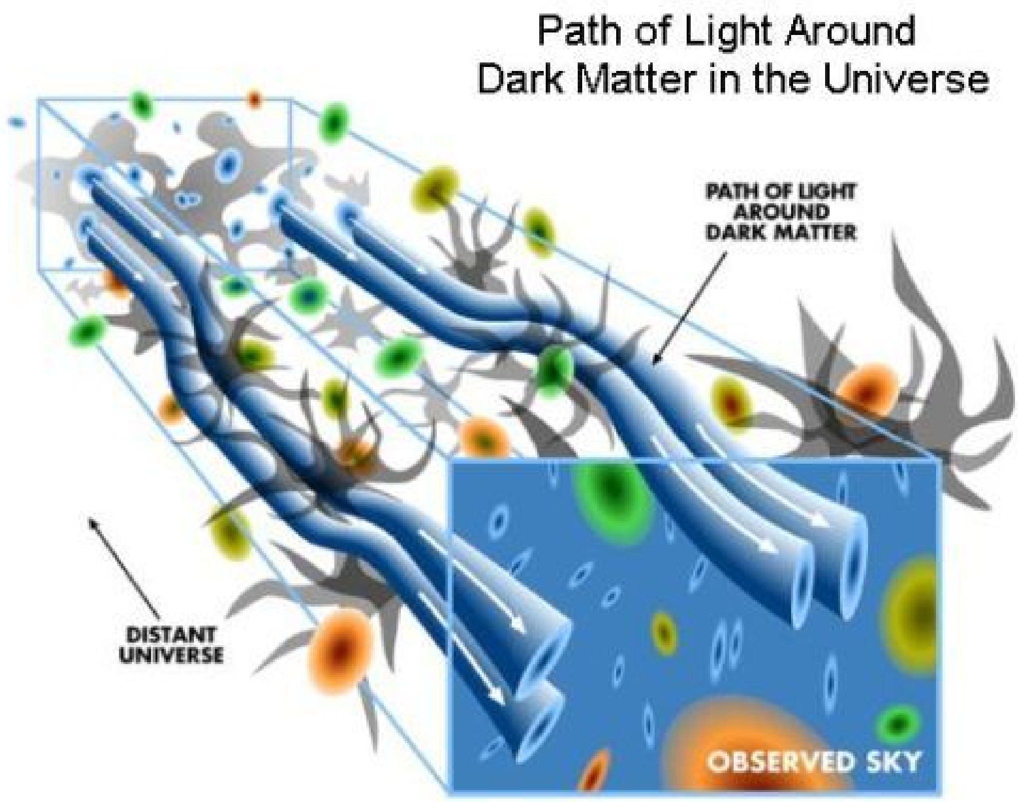


In the Big Rip model of cosmology, "phantom energy," a particular kind of dark energy supposedly fueling the accelerating expansion of the universe, will, in the course of time, undo all the bound states prevalent in nature. In this way galaxies would lose their constituent stars. Later solar systems would fly apart. Later still even atoms would break apart since electrons would no longer be held by their associated nuclei.

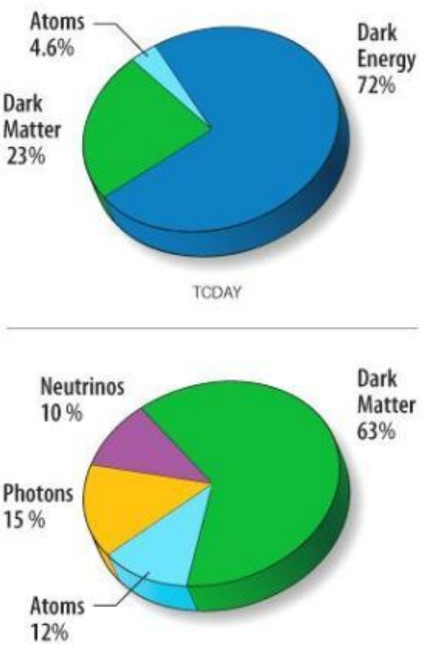
Reported by: Caldwell et al., Physical Review Letters, 15 August 2003

???? ???????? ?????? ????? ????????? ???????? ??? “?????? ???????????” (Big Crunch) ???.??? (Implosion) ???????? ????? ????????????! ???? ?????????????? WMAP “??????? ???????? ?????????” (Microwave Anisotropy Probe [MAP](), Launched in 2001) ????? ?????????? ????????????? “???? ???????” (Hot Spots) ?????????? ?????, ????????? ????? ??????????????? ??????? (Expansion of the Universe is Accelerating) ???????????????. ??!??? ????????? ???????? ??? ?????????? ???????? ??????? ????? ???????? ????????????? ????????.



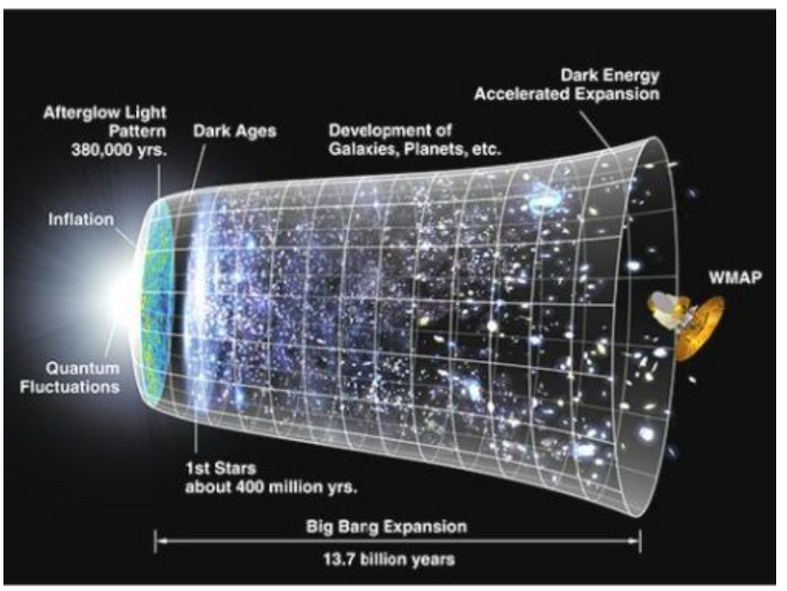
Weak lensing has high information content. If we know distances to source galaxies, the mass distribution and cosmic geometry can be measured as a function of redshift. Weak lensing thus has sensitivity to the evolution of dark energy. The light deflection by a foreground mass is given by a product of the mass inside the impact radius and a dimensionless ratio of distances. Both of these terms are affected by dark energy and other cosmological parameters. Combining lensing data with CMB data enables separate direct investigations of the growth of dark matter structure and multiple probes of the geometry from z~1 to the present.

“???? ????? ???????? ????????????? ?????? ???? ??????? ????????????,” ????? ???.?????????? ???????? ???????? ?????????? : “??? ????? ???? ?????? ????????? ??????? ???. ???????? ?? ??????. ??????? ???? ???????? ??????????, ????? ????????? ????????? ???????? ?????????.” ????????? ??????????? (Cosmologists) ???? ??????? ????? ????? ?????? ??.????????????????????????? ??????? (74%) ???????????? ??? ??????. ??????? ??????? ??????? (Dark Matter) 22% ????????? ????? ???? ????????????? ????????? ???????? ???????????, ?????????, ???? ???????????, ?????????? ??????? (????? ??????????? ??????? ?????) : 4%.



Content of the Universe

WMAP (Wilkinson Microwave Anisotropy Probe) measures the composition of the universe. The top chart shows a pie chart of the relative constituents today. A similar chart (bottom) shows the composition at 380,000 years old (13.7 billion years ago) when the light WMAP observes emanated. The composition varies as the universe expands: the dark matter and atoms become less dense as the universe expands, like an ordinary gas, but the photon and neutrino particles also lose energy as the universe expands, so their energy density decreases faster than the matter. They formed a larger fraction of the universe 13.7 billion years ago. It appears that the dark energy density does not decrease at all, so it now dominates the universe even though it was a tiny contributor 13.7 billion years ago.

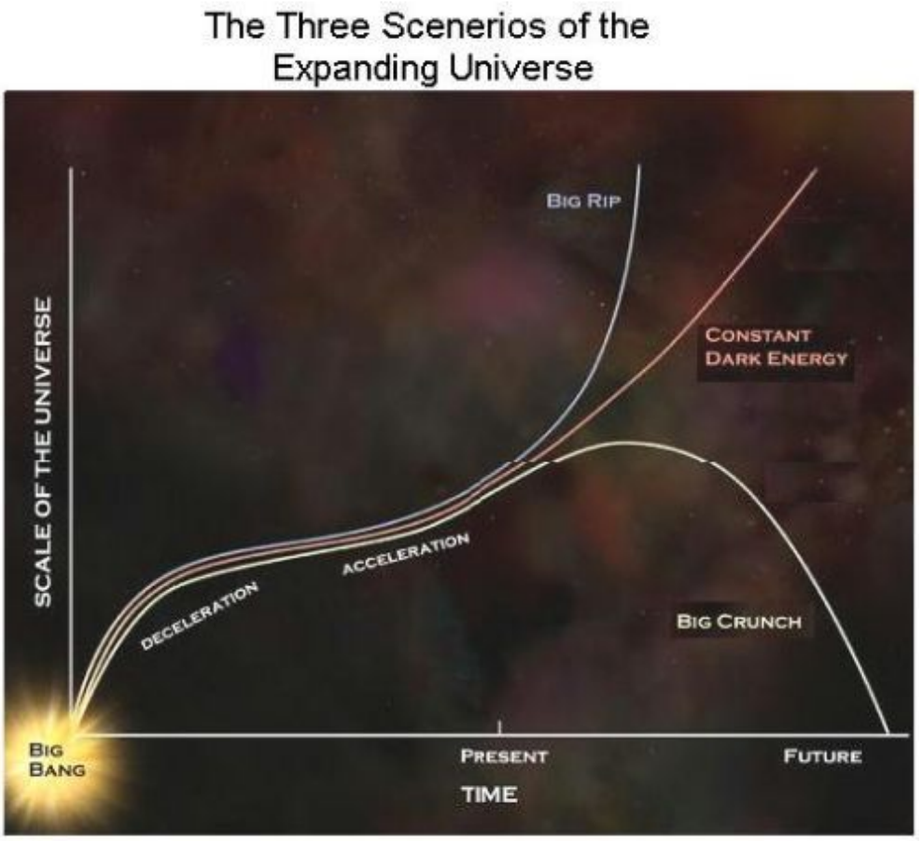


Time Line of the Universe

A representation of the evolution of the universe over 13.7 billion years. The far left depicts the earliest moment we can now probe, when a period of "inflation" produced a burst of exponential growth in the universe. (Size is depicted by the vertical extent of the grid in this graphic.) For the next several billion years, the expansion of the universe gradually slowed down as the matter in the universe pulled on itself via gravity. More recently, the expansion has begun to speed up again as the repulsive effects of dark energy have come to dominate the expansion of the universe. The afterglow light seen by WMAP was emitted about 380,000 years after inflation and has traversed the universe largely unimpeded since then. The conditions of earlier times are imprinted on this light; it also forms a backlight for later developments of the universe.

????????? ???????? ????????? ???????????? (Cosmological Constant)

1917 ??? ??????? ????????????? ????? ????????? ?????? ??? ???????????? ????????? ???????????????? ??????????? ???????????. ?????? ????????? ???????? ???????? ??????????????????????????????????????.??????????????????.(UniversewasStatic) ??? ?????????, ??????????? ???? ??????? ????????. ??????? ??????? ??? ????????????? ??????? ???????? ???????? ???????? (Gravitational Force) ???? ????? ???? ??? ????????? ??????????????????????????????. ????????????? 1929 ??? ????????????????? ??????? ??! ???? ??????????? ??? ????????????? ???? “???????????? ????? ???????? ???? (Biggest Blunder of Life) ????? ???????? ?????????????????? “????????? ???? ??????????” ??????????.??(Expansionof the Universe is Accelerating) ?????? ?????? ????????.



The future of the universe has three possible scenarios depending on this dark energy. The first scenario is if this dark energy is constant over time; then the expansion of the universe would continue accelerating forever. After a hundred billion years or so from now most of today's observable galaxies will not be visible (they will disappear from our sight but they will continue to exist)

The second scenario is if this dark energy increases with time then the universe will experience a catastrophic runaway expansion. Within 100 billion years or so from now every galaxy, star and atom in the universe will be ripped apart!!! This is called the "Big Rip"

The third scenario is if this dark energy decreases with time. This eventually leads to a slowing of the expansion of the universe followed by a recollapse. This is called the "Big Crunch". In some ways this scenario resembles the Big Bang in reverse.

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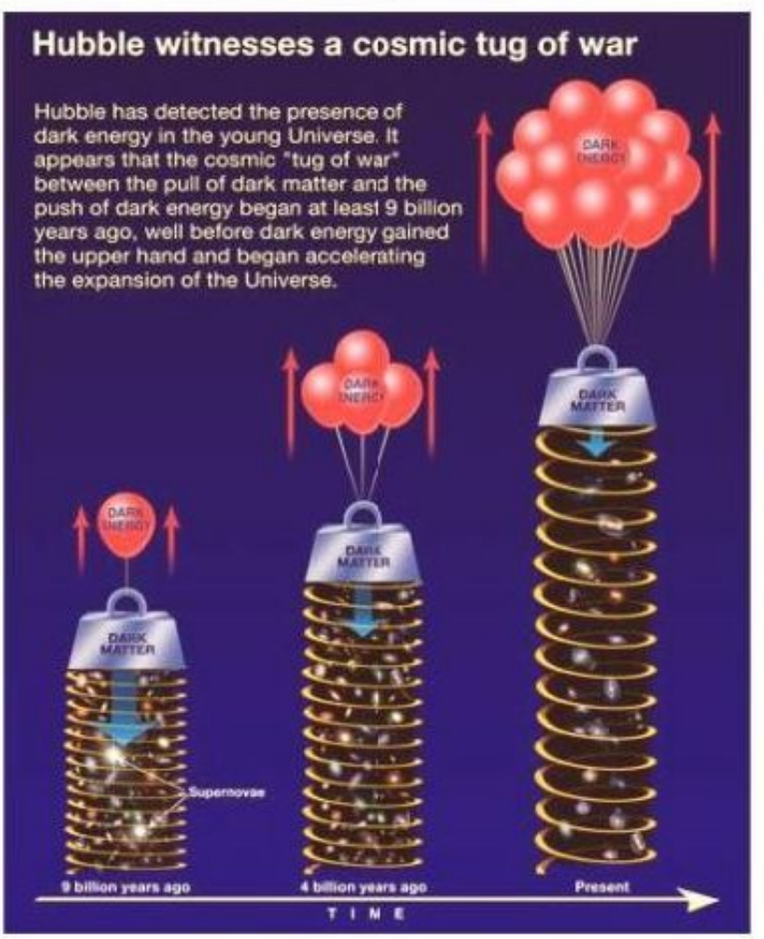
1998??! ???????????????????????????????: ??(Accelerating the Rate of Expansion)?????????!?????????????????????????? “??????? ?????” (Dark Energy) ????? ????? ????????. ??????? ????????? ????????? (Composition) ???? ?????? ????????????????, ????? ????????????? ?????? ??????? (Expansion Rate)???(Ultimate Fate) ???????? ????????? ??????? ?????????.



Hubble's Evidence for Dark Energy in the Baby Universe

Scientists using NASA's Hubble Space Telescope have discovered that dark energy is not a new constituent of space, but rather has been present for most of the universe's history. Dark energy is a mysterious repulsive force that causes the universe to expand at an increasing rate.

Investigators used Hubble to find that dark energy was already boosting the expansion rate of the universe as long as nine billion years ago. This picture of dark energy is consistent with Albert Einstein's prediction of nearly a century ago that a repulsive form of gravity emanates from empty space.

Credit: NASA, ESA, and A. Feild (STScI)

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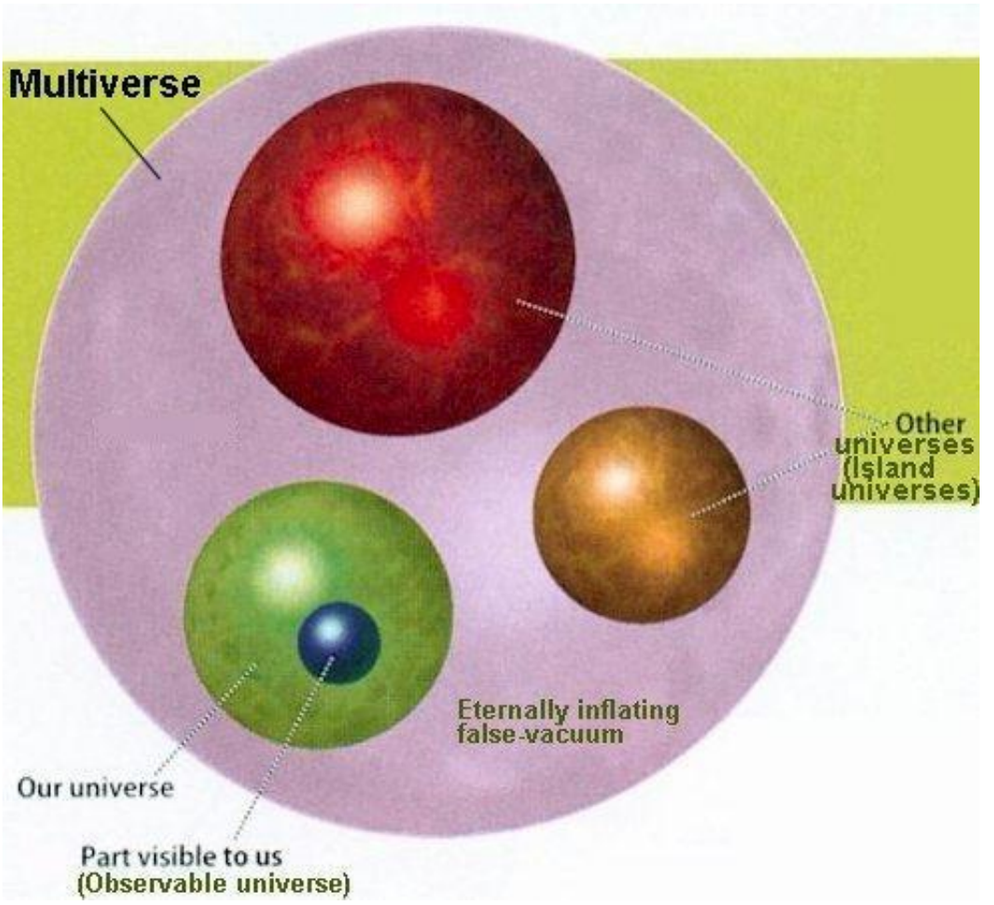
?????” (Big Rip) ????? ???? ??????????? ????????????? !



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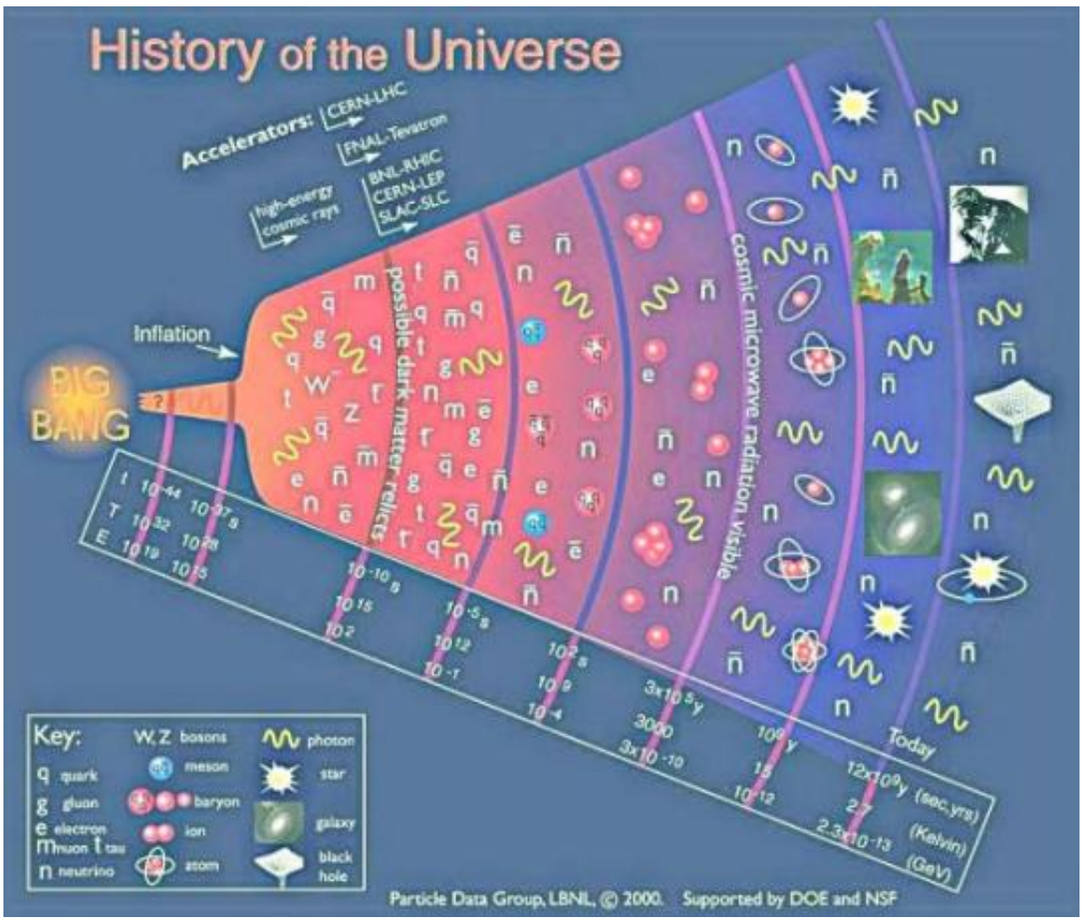

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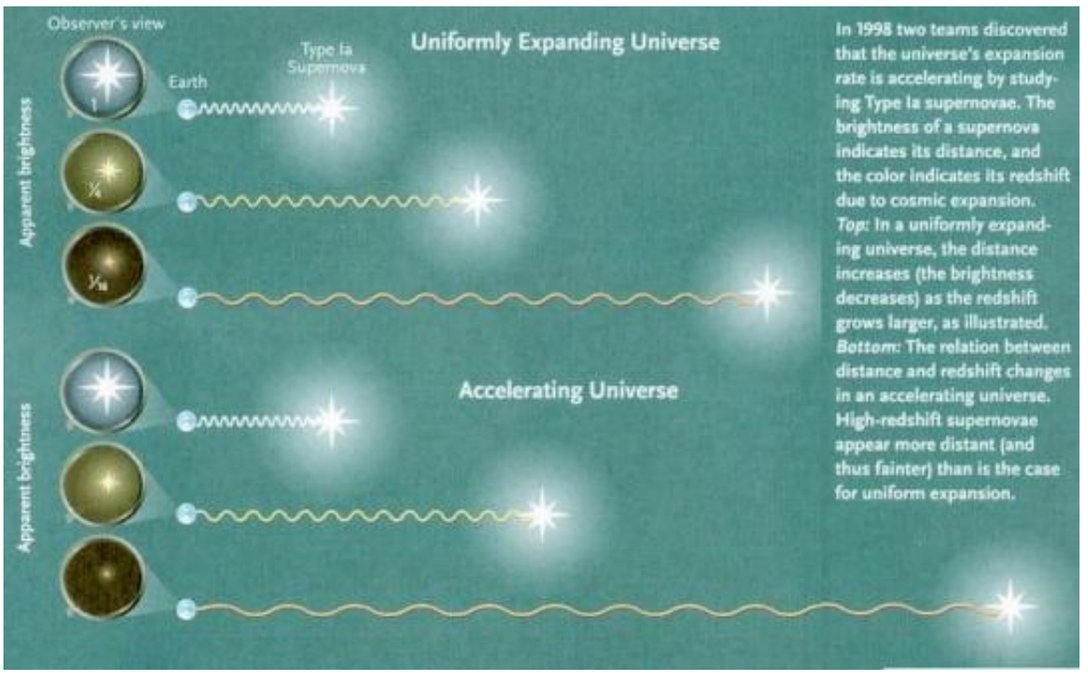
??? ??? ?????????? ??????? ????? ?????? ??????. ???????? ??? ?????? ????????????? ???????????? ???????? ???????????? (Galaxies's Gravity does not resist Expansion). ?????????? ?????????? ???????????? ???????? ??????? ????????? ??????? ????????? :

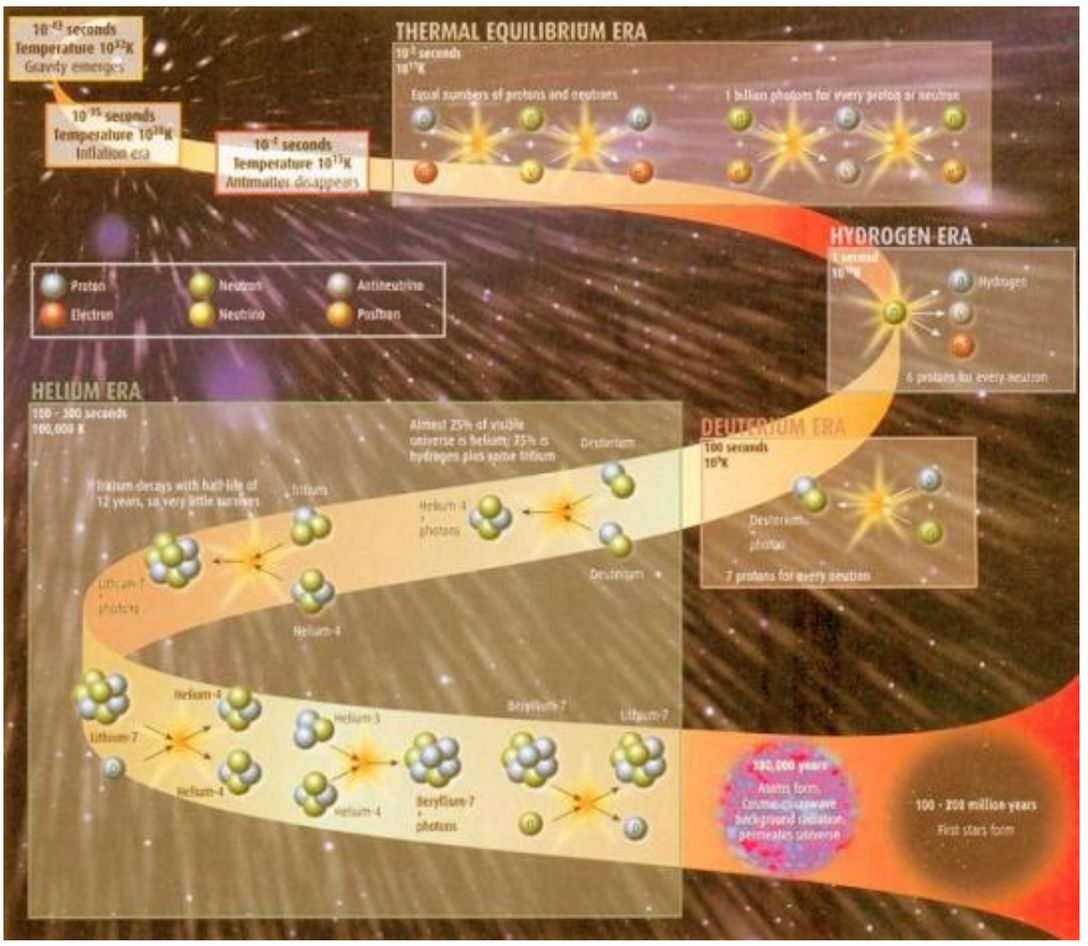
1. ?????????? ?????????? ??????? ????????? ??? ???? ??????? ??????? (Anti-Gravity Force) ????? ???????? ??????? ????? "???? ??????????" (Cosmic Accelerator) ????? ?????????? ????????.

2.??? ???? ?????????? (Secondary Effects) ???? ???????? : ???????????? ?????? ?????????? ?????? ????? ????????? (Filigree Pattern of Matter) ???? ???????.



??????????? ?????? ??? ????????? ???????????? ?????? "???????? ????????? ????????" ?????????? ??????? ????? ????????? (Choked off the Growth of Galaxy Clusters) !

3. ???, ??????????????????,??????????????????????????????????!?????????????????????????? ???????? ????? ???? ??????????. ??????? ????? ??????? ?????, ?????? ?????????? ??????????????????, ???? ?????? ???????? ??????? ??????? ????????? ! ?????? ???? ??????????????????????????"???????????"(HeavyElements)?????????????????????????? ??????? ????????????.



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Picture Credits: NASA, JPL; National Geographic; Time Magazine, Discovery, Scientific American & Astronomy Magazines. Earth Science & the Environmental Book.

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S. Jayabarathan (jayabarat@tnt21.com) (July 28, 2012)

http:jayabarathan.wordpress.com/