Heat death of the universe short story

This article is about the entropy of the universe; For other uses, see that the universe's heat death (qualifier). The Great Freeze is heading here. For other meanings, see Big Freeze (specification). There are several issues in this article. Please help fix this or discuss these issues on the call page. (See how and when to remove these template messages) This article contains too many or too long quotations for an encyclopedic entry. Please help improve the article by presenting the facts in a neutrally worded summary with relevant quotes. Consider the transfer of teleshopping to Vikinote. (September 2020) This article may contain original studies. Please correct this by checking the claims made and adding inline quotes. Only statements consisting of initial studies should be removed. (September 2020) (See how and when to remove this template message) (See how and when to remove this template message) The Possible Fate of the Universe Part of the Series of Physical Cosmology Of the Big Bang · Universe Universe Medieval Universe Sonimaa Central Epoch Grand Unification Epohch Electroweak epohch Quark epohch Hadron epohch lepch Footn epohch epohch Big Bang nucleosynthesis Inflation Dark Ages Stelliferous Era Backgrounds Cosmic Background Radiation (CBR) Cosmic Gravitational Wave Background (GWB) Cosmic Microwave (CMB) · Cosmic Neutrinos (CNB) Cosmic Infrared Background (INB) Enlargement · Future Hubble Act · Redshift Expansion of the Universe Accelerating the Expansion of the Universe Comoving and Correct Distances FLRW Metric · Friedmann Equations Inhomogeneous Cosmology Future Expanding Universe Ultimate Destiny Universe Heat Death Universe Big Rip Big Crunch Big Bounce Components · Structure Components Lambda-CDM model Baryonic substance Exotic matter Düri substance Energy Negative energy Zero-point energy Vacuum energy Radiation Background radiation Dark energy Quintet Phantom energy Dark matter Dark dark matter Dark matter Dark matter Self-heating dark matter Dark Matter Dark Radiation Dark Liquid Reflective Structure Shape Universe Reionization · Structure Formation Galaxy Formation Large-scale structure Large quasar group Galaxy filament Supercluster Galaxy cluster Galaxy group Local group Galaxy Dark Matter halo Star cluster Solar System Planetary System Void Experiments BOOMERanG Cosmic Background Explorer (COBE) Dark Energy Study Euclid Illustris project Vera C. Rubin Observatory Planck Space Observatory Sloan Digital Sky Survey (SDSS) 2dF Galaxy Redshift Survey (2dF) UniverseMachine Wilkinson Microwave AnisotropyProbe (WMAP) Scientists Aaronson Alfvén Alpher Bharadwaj Copernicus de Sitter Dicke Eddington Ehlers Einstein Ellis Friedmann Galileo Gamow Guth Lemaître , Konrihoidja Schmidt Schwarzschild Smoot Starobinsky Steinhardt Suntzeff Suntzeff Sunyaev Tolman Wilson Zeldovich Subject history Cosmic microwave radiation history Of the Big Bang Theory religious interpretations Cosmological theories timeline Cosmological theories by time Category Astronomy portalvte Universe heat death, also known as the Great Chill or the Great Freeze,[1] is a theory about the final fate of the universe , suggesting that the universe would develop into a thermodynamic free-energy state and would therefore not be able to maintain the entropy-enhancing processes. Heat death does not mean any specific absolute temperature; this only requires that temperature differences or other processes are no longer used for work. In physics language, this is when the universe reaches thermodynamic equilibrium (maximum entropy). When the topology of the universe is open or flat, or if dark energy is a positive cosmological constant (both of which are consistent with current data), the universe will expand forever and expect heat death[2], where cooling the universe approaches equilibrium at a very low temperature after a very long time. The hypothesis of heat death stems from the ideas of Lord Kelvin, who in the 1850s was the first president of the United States. The concept of the concept of universe heat death is based on the observation that the universe's gravitational potential energy, also known as recreational mass, which is held primarily in baryons, self-gravity shrinks and warms up to ever higher temperatures. As a result, the ever-smaller and increasingly hot baryons evaporate with exponential acceleration seemingly expanding into the surrounding space photon, so that eventually the universe consists of zero-frequency photons: when the rest of the mass decreases by Δm0, kinetic energy E = c2Δm0 is produced. The same is true if we replace kinetic energy with E production of bright energy. Then the energy from E = m0c2 would be produced and the rest of the mass of the body would disappear. — International Encyclopedia Unified Science Vol. 1, No. 6-10, University of Chicago Press, 1955, p. 460 Although mechanical energy is indestructible, there is a universal tendency to its dispersion, which produces the entire system gradually increasing and diffusion of heat, winding motion and exhaust potential material in the universe. - Thomson, William. The heat of the sun in the age of Macmillan's Magazine, 5. Baryons evaporation is described by Arthur Eddington: All change is relative. The universe extends relatively to our common material standards; our material standards are relatively diminishing to the size of the universe. The theory of an expanding universe can also be called the theory of a shrinking atom. < ... > Then let us take the entire universe into our standard persistence and take into account the position of the cosmic creature, whose body consists of intergala galactic spaces and swells as they swell. Or rather, we must now say that it holds the same size because he does not admit that it is he who has changed. Looking at us for a few thousand million years, he sees us shrinking; atoms, animals, planets, even galaxies, all shrink in the same way; only intergalactic spaces remain the same. The Earth revolves around the sun's ever-diminishing orbit. It would be absurd to regard this changing revolution as a constant unit of time. The cosmic creature naturally associates its length and time units, so that the speed of light remains the same. Our years decrease the number of geometric progressions in the cosmic timeline. On this scale, human life is becoming a briefer; and ten years of support. Due to the property of geometric progressives, the infinite number of our years adds up to the finite cosmic time; so what we should call the end of eternity is the usual finite date in the cosmic calendar. But on this date, the universe has expanded to infinity in our reckoning, and we have contracted something in the reckoning of the cosmic being. We walk on the stage, performers drama in favor of a cosmic spectator. As the scenes continue, he notices that the actors are getting smaller and quicker to act. When the final act opens the curtain on the rising dwarf actors rushing through their parts at frantic speed. Smaller and smaller. Faster and faster. The last microscopic, vague intense agitation. And then nothing. - Eddington, Arthur. The expanding Cup of the Universe, 1933, pp. 90–92 After all the baryons evaporate, the bath of zero-frequency photons condenses, which is indistinguishable from empty space, condenses into new protons, each passing through a further 13.8 billion years of soaring contraction and evaporation. And so ad infinitum: According to the standard view, dark energy leads the universe forever accelerating expansion. Every little thing will end up losing contact every other bit. It all just seemed incredibly boring to me, Penrose says. Then he found something interesting in it: at the end of the universe, the only remaining particles are masseurs. This means that everything that exists moves at the speed of light, making the flow of time meaningless. After a few mathematical manipulations of infinity, jumped out an endless universe in which the new big bangs are the inevitable result of the universe dying. In Penrose theory, one space leads to another. I used to call it a crazy plan, but I'm starting to believe it now, he says. Brooks, Michael. Roger Penrose: Non-stop space, non-stop career new scientist, 10 March 2010 Origins idea of heat death stems from another law of thermodynamics, one version of which states that entropy tends to increase in the isolated system. This suggests that if the universe lasts enough time, it will asymptoticly approach a country where all energy is evenly distributed. In other words, according to this hypothesis, mechanical energy (movement) in nature tends to dissipate into heat (energy conversion); thus, by extrapolation, there is a view that over time the mechanical movement of the universe becomes heat due to another law. The assumption that all the bodies of the universe are cooling down, eventually becoming too cold to support life, seems to have been first presented by french astronomer Jean Sylvain Bailly in 1777. Bailly thinks all planets have internal heat, and they're now in some particular cooling phase. Jupiter, for example, is still too hot for life to occur there for thousands of years, while the moon is already too cold. The last state, in this view, is described as one of the equilibrium where all motion ends. [3] The idea of heat death due to the laws of thermodynamics, however, was the first proposal to unravel the beginning of 1851 by Lord Kelvin (William Thomson), who theorized even more mechanical energy loss in the positions of Sadi Carnot (1824), James Joule (1843) and Rudolf Clausius (1850). Then Hermann von Helmholtz and William Rankine developed Thomson's views over the next 10 years. [quote needed] History The idea of the universe's heat death stems from the debate about the application of the first two laws of thermodynamics to universal processes. Specifically, in 1851, Lord Kelvin outlined a position based on recent experiments on dynamic heat theory: heat is not a substance, but a dynamic form of mechanical effect, we perceive that there must be an equivalent between mechanical work and heat, which is between cause and effect. [4] Lord Kelvin began with a general heat death in 1852. In 1852, Thomson published the Universal Tendency in Nature for dissipating mechanical energy, in which he outlined the initial second law of thermodynamics, summed up the view that mechanical motion and energy used in that motion naturally tend to dissipate or fall down. [5] The ideas set out in this document regarding their until the sun's age and the dynamics of universal operation attracted the likes of William Rankine and Hermann von Helmholtz. Three of them had exchanged ideas on this subject. In 1862, In the age of the heat of the Sun, Thomson published an article in which he repeated his basic beliefs in the indestruction of energy (first law) and the widespread dispersion of energy (the second law), which led to the spread of heat, the termination of useful movement (work), and the exhaustion of potential energy through material, while explaining his view of the consequences for the universe as a whole. Thomson wrote: The result would inevitably be a state of universal rest and death, if the universe was finite and left to obey existing laws. But it is impossible to imagine a boundary between the extent of matter in the universe; and therefore science refers to endless development through endless space, which involves the transformation of potential energy into palpable motion and thus heat, rather than one finite mechanism that runs down like a clock, and stops forever. [7] The years that followed both Thomson's 1852 [6] [8] [unreliable source?] Current status See also: Entropy § Cosmology and Entropy (time arrow) § Cosmology Proposals on the final state of the universe depend on assumptions made about its ultimate destiny, and these assumptions are 20. The hypothesis of an open or flat universe that continues to expand indefinitely, whether heat death or Big Rip is expected to eventually occur. [2] If the cosmological constant is zero, the universe will approach absolute zero temperature for a very long time. If the cosmological constant is positive, as appears to be the case in recent observations, then the temperature rises from zero to a positive value and the universe approaches a state of maximum entropy where further work cannot be done. [9] If The Big Rip does not happen long before that, and protons, electrons and neutrons related to the nucleus of the atom are stable and never decompose, a complete heat death situation may be avoided if there is a method or mechanism to restore atoms from radiation, dark matter, dark energy, zero-point energy or other sources such as the production of black holes and the energy that causes black holes to be released from the mass so that the masses they contain are released. , which could lead to the formation of new stars and planets. If so, it is at least possible that the formation and prevent the gradual de-run down of the universe into matter energy and heavier elements in stellar processes and the absorption of matter by black holes and their subsequent evaporation as Hawking radiation. [10] A new study published in November 2020 found that the universe is actually getting hotter. The study examined the thermal history of the universe over the last 10 billion years. It has found that the average temperature of gas throughout the universe has increased more than 10 times during that time and reached about 2 million degrees Kelvin today-about 4 million degrees Fahrenheit. Yi-Kuan Chiang, lead author of the study and a researcher at Ohio State University's Center for Cosmology and AstroParticle Physics, noted that Our new measurement provides a direct confirmation of the seminal work of Jim Peebles-2019, the Nobel Laureate in Physics-who laid out the theory of how a large-scale structure forms in the universe. [12] [Failed Verification – see Discussion] The time frame for the heat death main article: The future of the expanding universe from the Big Bang through the modern, matter and dark matter universe is thought to be concentrated in stars, galaxies and galaxy clusters, and is expected to continue to do so well into the future. Therefore, the universe is not thermodynamically balanced and objects can do physical work. [13]:VID Hawking's supermassive black hole has a supermassive black hole with a mass of approximately 1 galactic mass (1011 solar masses) of 10,100 years in a row[14] so that entropy can be produced at least until then. Some large black holes in the universe are predicted to continue to grow up to perhaps 1014 M☉ collapse of superparves of galaxies. Even they evaporate for up to 10,106 years. [15] After the universe enters the so-called Dark Era and is expected to consist mainly of gas diluted by photons and leptons. [13]:§VIA If only a very diffuse thing is left, the activity of the universe has been abruptly deviated, with very low energy levels and very long schedules. Speculative, it is possible that the universe may enter another inflation epohch, or assuming that the current vacuum state is in the wrong vacuum, the vacuum may break down in a lower-energy state. [13]:&& VE It is also possible that entropy production will cease and the universe will reach heat death. [13]:& VID Another universe may have been created with random quantum fluctuations or quantum tunnels of approximately 10 10 10 56 {\displaystyle 10^{10^{10^{10^{56}}}} years. [16] Over a large period of time, there would eventually be a spontaneous reduction in entropy through the re-semamic of Poincaré repetition[17], thermal fluctuations[18], [19] and fluctuation ing egeem. [21] [22] However, this scenario has been described as probably wrong, [and] completely untested. Sean M. Carroll, originally a proponent of this idea, no longer supports it. [24] [25] Opposing views Max Planck wrote that the phrase universe entropy has no meaning because it does not have an accurate definition. [26] [27] Recently, Walter Grandy writes: It is quite blatant to talk about the entropy of the universe, of which we still understand so little, and we wonder how the thermodynamic entropy of the universe and its main voters, who have never been balanced throughout their existence, could be defined. According to Tisza: If the isolated system is not balanced, we cannot link it to entropy. [29] Buchdahl writes of the completely unjustified assumption that the universe can be treated as a closed thermodynamic system. [30] According to Gallavotti: ... there is no generally accepted concept of entropy for imbalanced systems, even if it is in a stationary state. [31] When discussing the issue of entropy of non-balanced states in general, Lieb and Yngvason express their opinion as follows: Despite the fact that most physicists believe in such non-balanced entropy, it has so far proved impossible to define it in a clearly satisfactory way. [32] According to Landsberg, the third misconception is that thermodynamics, and in particular the concept of entropy, can be applied to the whole universe without further study. ... These questions are a kind of fascination, but the answers are speculation, and they do not fall within the scope of this book. [33] The 2010 entropy countries' 2010 work programme. The analysis looks at a number of possible assumptions that would be necessary for estimates and shows that the observable universe has more entropy than previously thought. This is because the analysis concludes that supermassive black holes are the biggest contributor. [34] Lee Smolin goes further: It has long been known that gravity is important to keep the universe away from heat balance. Gravitationally bound systems have a negative specific heat-it, i.e. the speeds of these components increase when the energy is removed. ... Such a system does not develop towards a uniform equilibrium state. Instead, it becomes more structured and heterogeneous as it fragments into subsystems. [35] This view is also supported by the fact that the recent situation has a stable, balanced balance in a relatively simple closed system. It can be assumed that the insulated system fragmented into subsystems may not be thermodynamically balanced and remain balanced. Entropy is transmitted from one subsystem to another, but its production is zero, which is not the Law on Thermodynamics. [36] [37] See also Arrow of Time Big Bang Big Crunch Large Rip Chronology universe cyclical model Entropy (arrow time) Fluctuationtheor graphic timeline from the Big Bang heat death paradox of the last question of the timeline of distant future magnitude (time) Thermodynamic temperature Links ^ WMAP - Destiny Universe, WMAP's Universe, NASA. Viewed online July 17, 2008. Viking Adult (published on 16 October 2008). (259) 259. Isbn 978-0-670-01997-7. June 1996 synths. The History of Modern Planetary Physics: A Foggy Earth. 1. Cambridge University Press. (2005) p. 77. Isbn 978-0-521-44171-1. In 2004, Tamm became the island's chief of staff. (1851). 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