



A Universe From Nothing **why there is something rather than nothing**

Lawrence M. Krauss

Afterword by Richard Dawkins

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Four hundred years of modern science have produced a remarkable and consistent picture of the expanding Universe. Everything holds together. The Big Bang picture is in good shape. [Lawrence M. Krauss]

My interest in the book was to learn more about the following three basic questions.

- Is there a plausible explanation of a universe from nothing?
- Where does the universe expand into?
- Was there an initiating force/energy/presence/influence from “outside”?

The author Lawrence M. Krauss leads us eloquently through all known breathtaking achievements by famous and other renowned experts in their fields who never became “household-names” like Einstein.

The mathematics and percentages the author is quoting, e.g. dark matter’s 10:1 relation to visible matter, 90% of invisible and unmeasurable dark energy in our Universe, the tools he describes to measure distances and weight of the universe, using supernovae as “standard candles”, apply gravitational lensing or “read” the Cosmic Radiation Background (CRB) and using the Genève Large Hadron Collider (LHC) experiments to determine whether we live in an closed, open or flat universe is all non-controversial according to Krauss and can be proven by many independent experiments and well-founded theories.

He explains that certain arrangements of relativistic quantum fields might explain the existence of the Universe as we know it while disclaiming that he "has no idea if the notion [of taking quantum mechanics for granted] can be usefully dispensed with". As his model appears to agree with experimental observations of the Universe (such as its shape and energy density), it is referred to by some as a "plausible hypothesis". His model has however been criticized by cosmologist George Ellis, who said it "is not tested science" but "philosophical speculation".[1]

According to relativistic quantum field theories, particles are to be understood, rather, as specific arrangements of the fields. Certain arrangements of the fields, for instance, correspond to there being 14 particles in the universe, and certain other arrangements correspond to there being 276 particles, and certain other arrangements correspond to there being an infinite number of particles, and certain other arrangements correspond to there being no particles at all. And those last arrangements are referred to, in the jargon of quantum field theories, for obvious reasons, as “vacuum” states. Krauss seems to be thinking that these vacuum states amount to the relativistic-quantum-field-theoretical version of there not being any physical stuff at all. And he has an argument — or thinks he does — that the laws of relativistic quantum field theories entail that vacuum states are unstable. And that, in a nutshell, is the account he proposes of why there should be something rather than nothing.[2]

It is a well-argued book with plausible explanations from 13.72 billion year onwards, but as an engineer I tend to get lost in the vortex of Einstein’s beautiful equations and the turmoil of appearance

and disappearance of “matter” within the nucleus of a proton dictated by omnipresent relativistic quantum fields – in short, even if Krauss’ theory is correct, for me the “turtles all the way down” question is not solved, that is, what was before?

Plodding through the book I gained the following insights to the above questions:

Is there a plausible explanation of a Universe from nothing?

Although Krauss is extremely argumentative and relies on proven facts of “redshift”, “accelerated expansion of the universe”, “dark matter and energy”, “a flat universe” and the logical conclusion that what is expanding must also have an beginning, the notion of dark energy being present but balanced to zero by negative energy and virtual particles is mathematically proved, for me still reaches into metaphysics (“dark energy is a complete mystery”[Krauss]), in particular the postulate that the Big Bang happened accidentally on the whim of a quantum fluctuation is hard to grasp.

As an engineer I can’t believe that from the first living cell to what ensued up to the year 2021 was all coincidental, shaped by the “laws which came into being with the instance of the Big Bang” and the following (unplanned) growing and adaption by “natural selection”.

Where does the universe expand into?

If I understood Krauss correctly, the flat universe expands for another 100 billion of years, the matter within the universe being dispersed, however the dark energy replenishing itself. The expansion will have the effect that the CRB finally will not be detectable from our Earth-location and the now visible Galaxies will not be detectable either, thus a future astronomer in our Universe equipped with most technical advanced observation tools will see nothing than empty dark space (nothing?) around us.

Was there an initiating force/energy/presence/influence from “outside”?

An outside initiation was not needed according to Lawrence Krauss because “the Universe behaves like a Universe with no purpose”, its creation was a complete random process. “We have enough evidence that we can explain the creation of our universe without any external influence. Nothingness is unstable and quantum fluctuation creates universes all the time, may they be infinitesimal small and disappear instantaneously or be inflationary – but in the end they all return to nothingness”

Nevertheless, I became a great admirer of Lawrence M. Krauss, it was intellectual fun to read his book and listen to his never wavering arguments because he starts you thinking!

However I would go with Ted Chiang (Sci-Fi author, The Tower of Babylon):

...for [man’s] longest journey would merely return them to the place whence they had come. Centuries of their labor would not reveal any more of creation than they already knew. Yet through their endeavor man would glimpse the unimaginable artistry of Yahweh’s work in seeing how ingeniously the world had been constructed. By this construction Yahweh’s work was indicated and Yahweh’s work was concealed. Thus would man know their place. [3]

References:

[1] Wikipedia, https://en.wikipedia.org/wiki/Lawrence_Krauss

[2] David Albert NYTimes, <https://www.nytimes.com/2012/03/25/books/review/a-universe-from-nothing-by-lawrence-m-krauss.html>

[3] Ted Chiang, “Towers of Babylon” in “Stories of Your Life and Others”
<https://www.goodreads.com/book/show/56389731-story-of-your-life>