



Cosmic Queries:

StarTalk's Guide to Who We Are, How We Got Here, and Where We're Going

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English edition by

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This is the book of the popular StarTalk podcast. According to the introduction it goes into the “deep” questions: how we got here, what is our place in the universe, are we alone, where does it end?

The first chapter introduces Aristotle and Newton meeting in a bar discussing their world’s viewpoints, thus setting the serious, but relaxed tone of the entire book parcelling known facts into easy to digest pieces of information. In a clever way it sums up the astronomical and astrophysical knowledge as of today giving homage to all the trailblazing men and women shaping our scientific understanding of our universe. As Neil deGrasse Tyson puts it in one of his inserted Twitter remarks “of how much we know about we don’t know”.

The authors lead us to astronomical milestones from Hubble’s discovery on Mount Wilson to the space-borne Nasa Hubble telescope and the quantum leap of discoveries enabled by more than 40 deep space instruments launched by Nasa, ESA and China, to be “crowned” by the upcoming James Webb telescope. One of the many successful scientific probes was the JPL Cassini project. Its planned crash into Saturn after mission accomplished is commemorated with the following poem:

Farewell Cassini –
how far you’ve come
on this eve in a fiery death.
Saturn and you are one!
VIP – Vaporize In Peace
2004 -2017

On goes the par force ride describing the largest telescopes on earth and other windows into the universe using neutrinos, gravitational waves, CMB, dark matter and dark energy leading to the explanation of the Big Bang and Cosmic Inflation.

Moving onwards through particle physics into Quarks, LHC and the next generation linear collider to string theory and loop quantum theory to arrive at the origin of life (Virchow: “All cells come from other cells”) and to the astonishing Miller-Ury experiment results.

External seeded life? This possibility can not be excluded after Nasa’s Stardust and ESA’s Rosetta experiment results. Whatever, the first carbon-based cell somehow originated under the “ideal” conditions of Earth. Evolution, mutation and selection created intelligent life thus enabling technology leading to the notion of artificial intelligence (Danny Hillis: “We are building machines, that would be proud of us”).

Another chapter is devoted to “are we alone in the universe?” Must life be carbon-based or could there be other forms? Is life only possible in the “goldilocks zones” of sun-like stars ? The Drake formula is discussed, the detection of the “Wow” signal in 1977 and the everlasting ever more sophisticated Search for Extraterrestrial Intelligence (SETI) program is presented.

Tweets by Neil deGrasse Tyson are given throughout the book – one remarkable tweet on search for extraterrestrial life should be quoted here: “Imagine a world where Nations find the search for life in the Universe more interesting than the taking of life on Earth”.

The final two chapters delve into the all-embracing questions: How did it all begin and how will it end? After an excursion into the quantum world of weak and strong forces, quarks and leptons and a glimpse of Heisenberg’s uncertainty principle you might not totally agree with physicist Victor Weisskopf that “two things make life worthwhile: Mozart and quantum mechanics.” The authors take you as close as 10^{-43} seconds after the Big Bang and describe the events leading to our today’s world we live in demonstrating we are indeed only stardust.

Our future fate is determined by the Sun who will begin to die in 5 billion years ending as a darkening, cooling cinder in space, however before that we will be long gone.

The fate of the Universe is not so clear, depending whether Hubble’s expansion is closed, open or flat. The various scenarios are discussed, however in the end all galaxies will drown in darkness.

The closing chapter deals with quantum vacuum fluctuation, discusses the notion of “nothingness” and thoughts about what “kick-started” the whole process. Is it like Edward Tryon postulated: “Our Universe is simply one of those things which happen from time to time” or doesn’t it make any sense to ask this question at all?

With Heisenberg’s principle of uncertainty the idea of Multiverses was born and the authors of the book arrive at a frontier which is as much a philosophical as a scientific one, opening the door for metaphysical conjectures and interpretations.

Appreciation

An excellent start for cosmic beginners and enthusiasts alike, the book provides the toolbox and a complete up to date background for understanding cosmology and today’s astronomical and astrophysical discussions “in a nutshell”.

I liked also very much the mentioning of the many scientific satellite projects which contributed a “quantum leap” in understanding the universe during the last century: Without spaceflight we would be deprived of another important “window” into understanding our existence on our planet.

After having read the book and looked back to the “time lapse” presentation of the discoveries and enlightenments from the geo-centered world view of Ptolemy to the singularity of the Big Bang and cosmic inflation interpretations – it made me believe that a little more humility would be appropriate and our singular Big Bang might not be the only one, but one of many having taken place before and will occur thereafter.

In this respect I recommend this book as an “awareness” opener without sitting through many long hours of scientific “cosmological” expert seminars.