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THE POST-PARADIGMATIC CHARACTER OF CONTEMPORARY COSMOLOGY

(ABSTRACT)

By this presentation, I intend the achievement of two aims. The first one is to defend the claim that, in contrast to all other contemporary scientific disciplines, which have long ago entered into their paradigmatic stage of development according to the methodological conception of Thomas Kuhn, cosmology has passed along another path of its growth. It has went out of its paradigm stage and today it is in a post-paradigmatic one.

My second aim is the thesis that the construction of contemporary cosmological theories could be affected by philosophical and aesthetical predilections, which although being set as not exactly scientific kind of prerequisites, exert methodological influence on scientific theorization.

Until very recently, having in mind the span of human history, say till the end of the twenties of the last century, our notion of the whole universe was limited only by the observations of our own galaxy – the Milky Way. Andromeda for instance was estimated to be a nebula of gas, not a galaxy.

The discovery of other galaxies did not immediately change the existing cosmological paradigm, but even strengthened, though for a short time, the belief in its validity. This *classical paradigm* rested on the avowed view that *the universe is eternal and limitless*, that is to say, that the universe has no beginning and no end in time, and has no boundaries in space. These fundamental prerequisites went also hand in hand with the conviction that the universe must be stationary, and not dynamically changing, since otherwise it ought to possess a beginning in time and probably limits in space.

The common embracement of this classical paradigm urged even Einstein to make a correction in his famous tensor equation of general relativity by inserting a special additional λ–member in it, with the only purpose to save the stationary character of the universe, presented by his fundamental equation.

The later acceptance of a genuine inception of our universe in the *big bang cosmology* was a crucial counter-example to the historically well-established classical paradigm. Thus, one may assume that the appearance of big bang cosmology is not simply a rejection of the classical paradigm, but also represents the launch of a new cosmological paradigm, at least since the sixties of the previous century.

My claim is that *the last assumption is not true*. It may be true, of course, concerning the establishment of what I call a *cosmological picture of the universe*, to play the role of a new paradigm. Its relatively wide acceptance is based on the agreement about some features, which characterize our contemporary knowledge about the beginning and the evolutionary change of the universe. Probably (the prevailing amount of) all astronomers and theoretical cosmologists would agree about a list of important features that characterize the universe. It started with a big bang some 13.8 billion years ago. It expands, leaving its early huge inflation aside, with a constant speed for some stage of its evolution, but now its expansion is accelerating. It displays a homogeneous distribution of galactic constellations in a large scale. It has a size of about 92 billion years.

This picture, however, can hardly take the place of a full-fledged theory staying at the base of a new cosmological paradigm. It might be the fact that the universe came into existence 13.8 billion years ago, but the real reason about its birth is still unknown. Was the big bang a steady quantum fluctuation (Susskind 2005: chs.3, 11; Hawking, Mlodinov 2005: ch.8; Krauss 2012: ch.9)? Was it a "big crunch" in a reverse collapsing stage of the universe after the end of its expansion that turned into a big bounce? Was the big bang a result of two colliding branes floating in an eleven dimensional spacetime of the so-called M-theory (Greene 2004: ch. IV), or some "play" of space-time geometry, or something else? These are hypotheses upheld by different scientists and demonstrating a *conceptual diversity*.

The material constitution of the hypothetical dark matter, as well as the nature of the dark energy imbedded in spacetime itself, are a subject of controversy among scientists. Contemporary physics has still not reached a "theory of everything", which has the pretension to unify the four fundamental interactions[1] for providing an essential understanding of our

[1] The electromagnetic, the strong nuclear, the weak nuclear, and the gravitational interactions.

universe under the spell of a "God equation", and thus to exculpate Michio Kaku's optimism for this cherished dream (Kaku 2021).[2]

I raise the claim that contemporary cosmology has went out of its paradigmatic stage not as an intended criticism of Kuhn's well-known methodological view about the paradigm structure of scientific growth.

The question "naturally" comes to the fore: "*Why there are many cosmological theories nowadays*? It appears that there exists a specific explanatory discontent among the upholders of different cosmological theories, although they try to account for the main observational data encompassed by the general cosmological picture. My claim is that this specific discontent is because they stick to different foundational conceptual prerequisites guiding the structure of their theories. These "foundational conceptual prerequisites" can be only of a philosophical and aesthetical nature.

Key words: classical cosmological paradigm, post-paradigmatic stage, universe, cosmological theories, recent astronomical observations.

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[2] There are several suggested models to quantize gravity, but their mechanism of quantization differs from the standard procedure for the quantization of the three remaining force fields by pointing to specific boson particles that transmit their dynamic action. Hence, even one avowed a success for quantizing gravity, this success cannot yet serve for the cause of a real *unification* of all four physical interactions.

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