A new cosmological paradigm: universal locality

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Abstract

After so many years of accepting the current cosmological paradigm which is mainly based on relativity theories and after discussing so many peculiar consequences of it, a new paradigm is introduced. A set of new definitions for the concepts of time, space, local universe and Cosmos are presented. The basic postulates are setting by induction arguments, starting from the era when Earth was the centre of Cosmos and continuing until today. The main task is a description for the range of our ignorance and not a certain proposal, since latter has proved to be only asymptotically reachable by intelligent beings.

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1 Current situation

The broadly accepted paradigm, [1], is that of an initially inflated expanding universe, after a big-bang. It is quietly assumed that one universe exists. There is also another assumption that it is fulfilled by the usual relativity concept of *continuous spacetime*. The basic *cosmological principle* is constituted of two axioms:

- *Isotropy*: an observer sees the same characteristics of universe despite the direction of observation
- *Homogeneity*: an observer finds the same properties for universe despite the position of observation

But the main challenges are those that are related with the concepts of *initial singularity* and the *beginning of time*:

- *Initial singularity*: the universe at its origin is supposed to have a density that tends to infinity
- *Beginning of time*: since latter is defined in an entropy-like way, then it is supposed that a previous status is not definable, thus we have a beginning of it.

Other questions that have emerged:

- What was existed before big-bang?
- From where does it come the additionally created space at universe's expansion?
- What about the conservation of information during the big-bang process?

There have been so many opinions expressed, about the above paradigm, that if we try to mention all of them we wouldn't be able to write anything else for thousand of pages.

2 Simple definitions for time and space

But what exactly time is? All of us have the common practise to use concepts in a manner that is compatible with all our previous knowledge, starting from school and ending at university. But, is everything that we daily use strictly been defined or we just, quietly, use what dominant theories have defined so? A detailed discussion on the definition of time can be found at [2]. Here we present only the main result.

Definition 1 *Time is the one and only one non spatial variable that we need in order to describe the spatial evolution of any system under consideration.*

Some consequences of the above definition are:

1. Time has not a beginning
   The concept of time-begin is an artificial one and not necessary for a definition.
2. Time has not a definitely arrow of direction
   This is a statistically observed fact in systems containing a huge number of randomly moving entities, like a gas.
3. We cannot combine time & space in a new entity called 'spacetime'
   Time is the variable needed to describe the motion of a system, while space is the variables required to define the concept of immobility for the same system. So, time & space are ontologically totally different concepts. Besides that argument, the discussion at section 2.1 of [2] shows that they are also not independent variables.

Except from time we also need a definition for space, not quietly referencing to any relativity theory.

Definition 2 *Space is the minimum required set of variables that you need in order to unambiguously describe the concept of immovability in the system under consideration.*

Here the departure from immobility, ie the concept of change or movement, can be defined inside the common Lagrangian approach:

Definition 3 *Change is the observed infinitesimal displacement of the components of a system.*

So, space is different from *dimension*.

3 Local universes and Cosmos

The concept of many universes or *multiverse* is not something new. What is the new entry here is the concept of ***universal locality***, *ie the classification of any universe as a local object, instead of a global one.*
Let us make a virtual trip to what Humanity has been accepted throughout the centuries and was later found to be totally false:

- *Earth* is not the *Centre of Cosmos (CoC)* (and we will not 'drop down' when we will travel at the 'end of the horizon')
- *Sun* is not the *CoC* (and even more it is not in the centre of our Galaxy)
- *Galaxy* is not the *CoC* (and even more it is not the centre of our Local Cluster)
- ...

So, let us perform the next big *inductive jump* and postulate that:

- Our *universe* is not *Cosmos* but is just one more *Local Universe*

Let us recall from [2] next:

Definition 4 Local Universe (LU) *is a member of the set of all possible universes, each of them characterized by its set of binding constraints that correspond to a possible mathematical realization.*

and from [3] the broader definition of *Universe* or *Cosmos*:

Definition 5 Universe *or* Cosmos *is the set of all* Local Universes*, while the creation and destruction of those* LU's *is a still unknown process to us.*

So, rather than arguing that we know what is exactly the *Cosmos*, we prefer to establish a measurement of our ignorance and define just a broader frame for starting a deeper searching.
It is necessary however to axiomatically support our definition. This can be done by using next Axiom:

Axiom 1 Cosmos *in principle should be more complicated than a creation* (Mathematics) *of one of its subsets* (Humanity).

Thus, since *Mathematics* have a set of theories dealing with the concept of *infinity*, it is reasonable to argue that *Cosmos* will, at least, have a structure of infinities too, including its multi-level one.
A reasonable conjecture after the above Axiom is:

Conjecture 1 *The structure of* Cosmos *can only asymptotically be explained by intelligent beings during the evolution of their scientific available tools at each stage of their civilization.*

Thus, whatever we claim about *Cosmos*, we will never be able to explain its multiplicity and we will only reach aspects of it. It is easy understood, under the above prism, that all classes of theories that they self-named *'Theory of Everything'* are just arrogant and overweening declarations.
Even the current approach can only help in understanding alone the class of *material local universes*, while there is not any prohibition to define, somewhere else, the concept of an *immaterial local universe*. But, although this approach probably seems now complicated, then it will be proven again to be a simplified one, after the human knowledge has reached a higher level of scientific consciousness.

4 Consequences

A first classification of the consequences is that the so called '*anthropocentric principle*' is getting smaller again and the concept of a *Centre of Cosmos* is moving away and becomes meaningless.
A second class is that all kind of philosophical questions about the existence of time and the origin of it and about before big-bang existences are also become non reasonable. Let's concentrate on two popular questions:

1. *What was existed before big-bang?*
   A properly, still not defined from us, local structure of *Cosmos* that leaded to the rise of our *Local Universe*

2. *What about time before the beginning of it?*
   Since we had not our system *(LU)* under consideration we did not also need a non spatial variable to describe it

A third class of claims is about *cosmological principle*. The concept of *Isotropy in rotations* seems not to be well defined, because we can accept at the creation of every LU a preferred type of rotation, ie clockwise or counter-clockwise, that should characterize that LU and should be experimentally observed by a suitable way.[1]
On the other hand, there is not any reason to claim that *Homogeneity* is valid at all, since at the boundaries of each LU surely exist phenomena that distinguish it from the inner part of it. Of course the terms 'boundaries' and 'inner' cannot be strictly defined now, since we must adopt first a suitable structure for the superset of *Cosmos*, but at least we can propose their existence. Additionally to this, we have found many phenomena on Earth, [8], which argue for the reality of local inhomogeneities.
A fourth class of consequences is that concerning relativity theories. As it is in details described, [3], those theories in general cannot serve as a cosmological paradigm. A brief summary of why follows:

- The concept of '*space-time*' is ill defined and not necessary, in general, for a definition of *Cosmos*
- We cannot simultaneously accept that the *speed of light* is an upper limit and that at initial inflation stage universe expanded with a much greater speed
- There exist so many *point singularities*[2] plus the *lack of gravitational waves detection*, that shrink the general relativity from an *equation of universe* to a *simple theory of gravity*

We can at this stage introduce a new Axiom in order to characterize our Physical Theories and the degree by which they are able to describe physical reality:

Axiom 2 *The existence of singularities in a theory is a measure of our ignorance at that specific physical field.*

As stronger and non-overcoming the singularities are (as in the case of GR), so greater our ignorance about the 'described process' is.

5 Further work to be done

Of course the fact that we can at least define our *cosmological problem* in a theory free formulation does not mean that we have ended our efforts. On the contrary, a new field of cosmological aspects opens up now:

[1] All objects of our solar system, as seen by looking down from above Earth's north pole, are moving in a counter-clockwise way, except from Venus and Neptune.

[2] See for example Eq. (11.40), (13.19), (13.21-22), (13.23-25), (14.13) of [4].

1. What should the background structure of *Cosmos* be minimally constituted from?

2. How does that structure intervene with the measurable quantities of each LU, starting from our own one?

3. How can we identify if there exists a preferred direction in rotation and then its clock- or counterclock-wise type?

A candidate field of research is the so called *'dark energy'* concept, which has introduced by using the GR cosmological Λ constant and has been proposed from astronomical observations, [5], [6] etc, a brief description, [7]. This concept has to be re-defined in a manner which will be *relativity free*, since we have observed many peculiar phenomena on Earth that could be explained by adopting a locally increased appearance for a kind of negative density. The relevant research will probably reveal the properties of *Cosmos* minimal background, for material local universes and possibly will be a connection to the *immaterial world*, [8].

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