Misconceptions about modern cosmology

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Questions
- 1) Is space really expanding?
- 1 a) What is the true size of the visible universe?
- 2) Does the equation of state an usual perfect fluid one?
- 3) Why the concept of locally inertial frame is not often used?
- 3 a) Why the concept of free fall observer is not often used?
- 4) Why the half plane of the De Sitter models is not often used?
- 5) Why is it often said that hic et nunc we have $a(t_0) = 1$?
- 6) Does Higgs boson or Mach principle which gives inertial mass?
- 6 a) Does the use of inflationary models needed?
- 7) Is it necessary to quantify general relativity?

In fact all these questions rested upon the same epistemological one, according various point of view : the ontological temptation.

Hints
- a 1) The concept of space-time has no ontological meaning (Zénon, Aristotle, Avicenne, ..., Kant, Poincaré, Tarski, ...).
- a 2) The concept of space-time is a mathematical one; the coordinates have no physical meaning as Einstein said.
- b 1) The Birkhoff theorem could always be used, but locally.
- b 2) A Painlevé form always exists, globally.
- c) Each model has at any point an osculating De Sitter space.
- d) The redshift is a lapse, a Doppler and gravitational one.
- e) Some models are compatible with the Mach principle.
- f) The equation of state is not in general an usual perfect fluid one.
- g) The Poincaré group imply the Heisenberg inequalities.

Proofs
- I- No stretching of space, a bibliography :
"Cosmological Physics" Peacock, pages 87-89, Cambridge University Press, 1999. He said: "An inability to see that the expansion is locally just kinematical also lies at the root of perhaps the worst misconception about the big bang."


They said: "In this paper, we have shown how a consistent description of cosmological dynamics emerges from the idea that the expansion of space is neither more nor less than the increase over time of the distance between observers at rest with respect to the cosmic fluid."

Martin Rees and Steven Weinberg (1993) said: "...how is it possible for space, which is utterly empty, to expand? How can nothing expand? The answer is: space does not expand. Cosmologists sometimes talk about expanding space, but they should know better."

See also:

Baryshev, Yu. "Expanding space: the root of conceptual problems of the cosmological physics", 2008pc2..conf...20B?

Bunn, Emory F. and Hogg, David W. "The kinematic origin of the cosmological redshift", 2009AmJPh..77..688B?

Domenico Giulini "Does cosmological expansion affect local physics?" arXiv:1306.0374v1 [gr-qc] 3 Jun 2013; "I argue that a pseudo Newtonian picture can be quite accurate if "expansion" is taken to be an attribute of the inertial structure rather than of "space" in some substantivalist sense. This contradicts the often-heard suggestion to imagine cosmological expansion as that of "space itself"."

So no stretching of space and the cosmological redshift is a Doppler one.

II- A mathematical tool:


He said in his preface: "I have tried here to put off the introduction of geometric concepts until they are needed, so that Riemannian geometry appears only as a mathematical tool for the exploitation of the Principle of Equivalence, and not as a fundamental basis for the theory of gravitation."


A simple proof that Einstein’s theory is obtained as the covariant and relativistic form of Newton’s theory (via the Poisson equation).

- IV- "What is the origin of the mass of the Higgs boson?" M. Novello, E. Bittencourt, http://arxiv.org/abs/1209.4871; the authors "present a unified description of mass generation mechanisms that have been investigated so far and that are called the Mach and Higgs proposals." But "Besides, the Higgs mechanism has a very crucial drawback: it is obliged to assume that the mass of the Higgs boson has a different origin than all other particles."


- VI- "Adversus singularitates: The ontology of space-time singularities", Gustavo E. Romero, arXiv:1210.2427v1 [physics.gen-ph] 8 Oct 2012: it is about the incompleteness theorems in the general relativity theory such that the so called "singularity theorems".


- IX About Quantum Mechanic and relativity; on an epistemological point of view: read the thesis (on line) : "Le possible, l’actuel et l’événement en mécanique quantique, une approche pragmatiste", Manuel Bächtold, université Paris 1-Sorbonne, 2005.

Note: the labeling is different because each hint or proof often involves several issues.

Why such misconceptions?
- *A) The global theory of differential geometry appears just before the beginning of the second world war (with Cartan and others) and was known after 1945. Before, only local theory resting upon tensor calculus could be used.

- *B) The theoretical pluralism is forgotten since the death of Poincaré (1912)

- *C) Mathematicians and theoretical physicists are too often "Platonician" and not "Aristotelician".

- *D) It is very difficult to searchers to be understood in the laboratories all around the world, when they give a counterexample to a "well known theorem"; in general a local theorem, not globally valid.

- *E) The competition between teams of scientists pushes to the leak in the abstraction.

- *F) A lack of general culture epistemological and historical since 100 years in our universities is dramatic.

**Conclusion?**

The human animal is limited, like any animal. It certainly has an extraordinary development in terms of evolution. But its main limitation is often "to take bladders for lanterns". Indeed he takes, thanks to its faculties, abstract concepts which he conceives, as expressing reality. This is the ontological temptation (especially in the West). Is it the common epistemological answer to all these questions?

If yes, so a long life for De Sitter models which are a starting point to solve all these issues.