Present questions regarding the value of Hubble's constant and their implications on the cosmic standard model

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This talk is about the shifts, the "tensions" which appeared during the 20 last years between the various measures of the cosmic parameters underlying the LCDM[1] model: among others, measures of Hubble's constant (H_0): the ones resulting from the analysis of anisotropies in the cosmic microwave background (CMB), including the ones of *Planck Collaboration*, let us retain the value 67,27 km s^{-1} Mpc^{-1} ± 0.60 (68% CL) [1]; the ones resulting by contrast directly from observations in the near universe, including the ones of *SH0ES Collaboration* [2], let us retain the value 73,04 km s^{-1} Mpc^{-1} ± 1, (68% CL) [1]. More broadly, among the set of measures made in the near universe compared to those made on the CMB, the incompatibility, the lack of overlap of the error margins around the values obtained seems certain at more than 4.5s [1].

After reminding the definitions of Hubble's constant, the elements of the LCDM model - metrics, FLRW equations, fluids composing the universe and their state equations -the talk will introduce some methods for measuring H_0: direct measures in the near universe, measures drawn from the Baryon acoustic oscillations remaining in the structure of the spatial distribution of galaxies, and last, measures "model dependent" drawn from CMB's anisotropies. Then, in order to better understand some possible theories, we will introduce the principle of the models used to reconstruct the CMB's power spectrum from the dynamics of fluids prior to the recombination, so as to be able to compare it with the observed spectrum and make use of the whole set of information the latter provides.

The third part will focus on a non-exhaustive picture of ideas proposed for solving the tensions, by distinguishing « early type solutions » from « late type solutions » depending on these solutions being related to the physics before or after the recombination.

Bibliographic elements:

1- Cosmology Intertwined, A Review of the Particles Physics, Astrophysics and Cosmology, associated with the Cosmological Tensions and Anomalies. *Submitted to the Proceedings of the US Community Study on the Future of the Particle Physics, 2021*

2- Marc Kamionkowski and Adam Riess The Hubble Tension and Early Dark Energy, *Ann. Rev. Nucl. Part. Sci. 2023*

3- Pablo Lemos and Paul Shah. The Cosmic Microwave Background and H_0 arXiv:2307.13083v1 24 Juil 2023

[1] Lambda cold dark matter
[2] For Supernova H_0 for the Equation of State, Adam Riess, John Hopkins University