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INCORPORATION OF MACH'S PRINCIPLE IN FRW COSMOLOGY THAT DEPENDS DYNAMICALLY OF THE DISTANCE RANGE


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INCORPORATION OF MACH’S PRINCIPLE IN ΛFRW COSMOLOGY THAT DEPENDS DYNAMICALLY OF THE DISTANCE RANGE

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It postulates a FRW cosmological model without dark matter and cosmological term depending the distance scale, in addition to incorporate Mach’s principle, is consistent with the observations: rotation curves of the galaxies, the nucleosynthesis primordial and CMB. The dynamic expression of Cosmological term is an alternative to non-baryonic dark matter and a reinterpretation of dark energy.

The Mach principle inspired the General Relativity, by postulating that the local inertial frame is determined in some way by the movement of distant astronomical objects. Assuming that the universe dynamics is prescribed only by the Newton force of gravity we encounter serious difficulties: can not explain the rotation curves of galaxies, in rich clusters of galaxies the observed mass is significantly lower than expected and, in cosmological scales, the observed baryonic matter density is much lower than predicted by the FRW models with cosmological constant and zero curvature. We assume that any particle with nonzero rest mass is subject to the Newtonian gravitational force, and an additional force that varies with the distance in inter bodies. Whose origin is baryonic matter, and represents the inertia, of large-scale distribution, of bodies. Which postulates a FRW cosmological model without dark matter.In early universe considering nonbaryonic dark matter. In early universe the sources, the reduction in the Newtonian field cosmological term Λ is asymptotic and using (2) with \( r_c \approx 10h^{-1}\text{Mpc} \) (for which the potential is minimal), then(Falcon 2013): \( \Omega_\Lambda \approx \Lambda_0 \frac{c^2}{3H_0^2}(r_c) \); \( \Omega_{YIF} \equiv -\frac{c^2\Lambda(r_c)}{3H_0^2} \) then the Friedmann equation is now:

\[
\frac{k_s^2}{R(t)} = H_0^2 [\Omega_m (1 + \Omega_{YIF}) + \Omega_\Lambda - 1],
\]

where we used the standar notation for the dimensionless parameters of the density of the matter, cosmological term and the deceleration. Replacing (2) into (4) with \( r \approx 2r_0 \), of the order of \( 100h^{-1}\text{Mpc} \), as inner the cosmological distance range, we obtain \( \Omega_\Lambda \approx 0.7 \). The incompatibility between the flatness of the Universe and the density of matter in the Friedmann equation is removed, because if that \( k = 0 \) and \( \Omega_\Lambda \approx 0.7 \) we obtain \( \Omega_m \approx \Omega_\Lambda = 0.03 \) without considering nonbaryonic dark matter. In early universe neither affects the calculation of time decoupling between matter and radiation, neither the primordial nucleosynthesis. Also fully comply the Mach Principle, through of the incorporation of the dynamic cosmological term Λ(r). At large distances from the sources, the reduction in the Newtonian field would be offset by an interaction that is growing at much greater distances. These long-range interaction could be caused by the baryonic mass and would be calculable with physics usual.

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