

Modified General Relativity and the Centenary Einstein Equations

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A century of experimental tests and observations have reinforced the status of the general theory of relativity as the correct theory of gravity, applicable in all scales where it has been tested already. The recent observations of the gravitational waves from astrophysical sources have extended this confidence into its radiation sector as well. I will discuss and then prove two necessary modifications to the original Einstein equations that drastically alter the theory, while being fully consistent with all the precision tests and observations hitherto. One of these modifications affects the large scale physics in many fronts [1,2] and the second, proportional to \hbar , manifests in the microscopic world [3]. The modifications are well motivated by arguments of internal consistency and cosmological observations that were not available when the theory was formulated. Comparison with the hypothetical situation involving the electromagnetic fields and their sources on a cosmological scale will clarify the conceptual basis of the modification. I will show that the resulting ‘centenary Einstein equations’ are fully consistent with the mathematical requirements and in agreement with all observational results without exception, while providing a fully Machian framework with new predictions. One of the key predictions involve the failure of the Einstein Equivalence Principle in the untested context of clocks in an accelerated frame. There is additional experimental evidence for the correctness of the modified equations, from electrodynamics in the presence of matter and its gravity.

References:

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3. C. S. Unnikrishnan, arXiv:1812.06088.