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The CMaDE Model: a simple Quantum Mechanical explanation for the Accelerated Expansion of the Universe

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Nowadays one of the greatest mysteries of science is to find out why the universe has an accelerated expansion. In this talk we show that by considering the quantum nature of the gravitational field, we can associate an effective Compton mass to the wavelength of the graviton. The Compton Mass Dark Energy (CMaDE) model proposes that this mass can be interpreted as dark energy, with a
Compton wavelength given by the size of the observable universe R_H, implying that the dark energy varies depending on this size. We find that the dark energy density rate is given by $\Omega_\Lambda = 2\pi^2/3/R_H^2$, it has no free constants and depends exclusively on the radiation rate Ω_r. Using $\Omega_r = 9.54 \times 10^{-5}$, the theoretical prediction for a flat universe of the dark energy rate is $\Omega_\Lambda = 0.6922$. We perform a study in general for a non-flat universe, using the Planck data and a modified version of the CLASS code we find a very good fit with the Cosmic Microwave Background and Mass Power Spectrum profiles, provided that the Hubble parameter today is $H_0 = 66$ km/s/ for a flat universe and $H_0 = 72$ km/s/Mpc for an universe with curvature $\Omega_k = 0.05$. We conclude that the CMaDE model provides a natural explanation for the accelerated expansion and coincidence problem of the universe.

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