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Non-local gravity and dark energy

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We discuss recent work on non-local modifications of gravity obtained adding a term $m^2 R$ $Box^{-2}R$ to the Einstein-Hilbert action. We find that, despite the presence of a mass parameter, the resulting theory has no ghost, no vDVZ discontinuity, and no no Vainshtein radius below which the theory becomes strongly coupled.

For m of order H_0 the theory therefore recovers all successes of GR at solar system and lab scales, and only deviates from it at cosmological scales. We examine the cosmological consequences of the model and we find that it automatically generates a dynamical dark energy and a self-accelerating evolution. After fixing our only free parameter m so to reproduce the observed value of the dark energy density today, we get a pure prediction for the dark energy equation of state,

$w_{DE} \simeq -1.14$. This value is in excellent agreement with the Planck result $w_{DE} = -1.13^{+0.13}_{-0.14}$ and would also resolve the existing tension between the Planck data and local measurements of the Hubble parameter.

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