# Nonlocal infrared modifications of gravity and dark energy

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Even if the fundamental action of gravity is local, the corresponding quantum effective action, that includes the effect of quantum fluctuations, is a nonlocal object.  These nonlocalities are well understood in the ultraviolet regime but much less in the infrared, where they could in principle give rise to important cosmological effects.  The requirement of providing a viable cosmology severely restricts the form of the allowed nonlocal terms. We discuss in detail a model, proposed and developed by our group in the last few years, in which: (1) there is a viable FRW background  evolution, with accelerated expansion without cosmological constant. (2) Cosmological perturbations are well behaved. (3) The model fits the CMB, BAO, SNe, structure formation data and local $H_0$ measurements at a level statistically equivalent to $Lambda$CDM, and complies with solar system bounds.  (4) Gravitational waves propagate at the speed of light, complying with the limit from GW170817/GRB 170817A. The model also gives non-trivial predictions for modified GW propagation, that could be tested with the Einstein Telescope or with the LISA space interferometer.