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Dark energy is the cosmological quantum vacuum energy of light particles. The axion and the lightest neutrino. H.J. DE VEGA, LPTHE/CNRS/Univ Paris VI-VII — We show that the observed dark energy (DE) originates from the cosmological quantum vacuum of light particles which provides a continuous energy distribution able to reproduce the data.Bosons give positive contributions to the DE while fermions yield negative contributions. As usual in field theory, ultraviolet divergences are subtracted from the physical quantities. The subtractions respect the symmetries of the theory and we normalize the physical quantities to zero for the Minkowski vacuum. The resulting finite contributions to the energy density and the pressure from the quantum vacuum grow as $\log a(t)$ where $a(t)$ is the scale factor, while the particle contributions dilute as $1/a^3(t)$. The DE equation of state results $w(z) < -1$.The quantum cosmological vacuum of a scalar particle can produce the observed DE provided:(i)its mass is of the order of 10^{-3}eV=1 meV, (ii) it is very weakly coupled and (iii) it is stable on the time scale of the age of the universe. The axion appears as a natural candidate. The neutrino vacuum can give negative contributions to the DE. We find that w(z=0) is slightly below - 1 by an amount ranging from -1.510^{-3} to -810^{-3} while the axion mass results between 4 and 5 meV. DE arises from the quantum vacua of light particles in FRW cosmological space-time in an analogous way to the Casimir effect in Minkowski space-time with non-trivial boundaries.

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