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Rates of Charged Clocks in an Electric Field. MURAT OZER, None — The gravitational arguments leading to time dilation, redshift, and spacetime curvature are adapted to electric fields. The energy levels of two identical positively charged atoms at different potentials in a static electric field are shown to undergo blueshift. Secondly, the period of a charged simple pendulum (clock) in the electric field of a metallic sphere is shown to vary with the electric potential. The spacetime diagram for the world lines of two photons emitted and absorbed by two pendulums at different potentials at different times and the world lines of the pendulums, as in Schild's argument, is shown to be not a parallelogram in Minkowski spacetime, concluding that spacetime must be curved. A Pound-Rebka-Snider experiment in an electric field is proposed to confirm that photons undergo a frequency shift in an electric field and hence the spacetime manifold is curved. Next, Torretti's gravitational argument that spacetime around a mass distribution concentrated at a point is curved is extended to electric charge distributions to conclude that the nonuniform electric fields of such charge distributions too curve spacetime. Finally, the local equivalence of a uniform electric field times the charge to mass ratio to a uniform acceleration is shown through spacetime transformations and the electrical redshift is obtained in a uniformly accelerated frame by using this principle. These arguments lead to the conclusion that special relativistic electromagnetism is an approximation to a general relativistic multi-metric theory.

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