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**Time Dependence of the Speed of Light: A Measurement Needed**
FELIX T. SMITH, SRI International — Constancy of the speed of light has been unquestioned in physics and cosmology for 100 years, and it underlies applications such as GPS. Pauli stressed that Einstein's derivation of Lorentz invariance in mechanics and electromagnetism required the postulate that the measured speed of light is independent of the velocity of the light source, but not the wider condition of constancy of $c$ throughout in space and time. Limits on the variation of $\alpha = e^2/4\pi\varepsilon_0 c\hbar$ cannot constrain $c$, because either $e$ or $\varepsilon_0$ may also vary. Cosmologists have pointed to important consequences if the light speed has declined systematically since the Big Bang. Two predictions [S. S. Stepanov, (2000); F. T. Smith, (2005)], differing by a factor of 2, connect $c^{-1}dc/dt$ with the reciprocal Hubble time. Modern optical techniques make possible a direct measurement of limits to the rate of change of $c$ (or equivalently, to the rate of change of the measured length of a standard test object) to the needed precision. To avoid microcrystalline changes in length, the test object may need to be maintained at liquid nitrogen temperature or below both during and between measurements.

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