Abstract Submitted
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Measurement of the Depression of the Velocity of Focused Beams of Light with a Gouy-Phase Interferometer ANDREW MADEY[1], University of Oregon — An apparatus is demonstrated that was constructed to show the depression in group velocity v_g of a focused Gaussian (HeNe laser) beam, and arguments presented for the effects of this demonstration on the theoretical basis of Special Relativity. An exploration is conducted of Einstein's theoretical underpinnings for Special Relativity, that light pulses travel at a fixed group velocity $v_g = c$. This is accompanied by theoretical proof that v_g for a focused Gaussian beam is depressed upon focusing, if the beam has a frequency-independent radius, related to the Gouy phase shift. An account of the operation of the apparatus is presented, and data from the operations related, verifying the change in v_g. This contradiction of Einstein's assumption, without effect on the experimental validity of Special Relativity, is reconciled by referring to Poincaré's derivation of Special Relativity's equations, which assumes simply that Maxwell's equations retain their form across inertial reference frames.

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