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Measuring Speeds with Microwave Interferometry LOGAN HILLBERRY, Colorado Sch of Mines — The speed of an approximately frictionless cart is simultaneously measured in two ways. A 10.5 GHz microwave source is used in the familiar Michelson interferometry setup with one of the arms being the mobile cart and the other being a stationary microwave receiver. As the cart travels, the changing interference pattern is captured on an oscilloscope which, when combined with the source frequency, can be used to determine the cart's speed. The second speed measurement is achieved by sending a laser beam across the cart's path into a photo detector which is connected a second channel on the oscilloscope. The cart breaks the beam and travels a distance equal to its length before allowing the beam to reach the photo detector again. Using the oscilloscope's timing measurement and the known cart length, one can readily calculate the cart's speed. Comparison of the two methods conveys agreement within error, confirming the path length difference model used to calculate the speed of the cart in the microwave interferometry method.

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