

Michelson Interferometer

Another possibility is to vary the phase by changing the speed of the waves in the two arms.

Recall $v=c/n$ where n = index of refraction.

Using $\lambda = v/f$, the number of wavelengths in arm 1 is:

$$N_1 = \frac{L}{\lambda_1} = \frac{n_1 f L}{c} \quad \text{and similarly for arm 2.}$$

(You can think of it as the path being longer by n .)

The phase difference is thus:

$$\phi = 2\pi(N_1 - N_2) = 2\pi(fL/c)(n_1 - n_2)$$

This makes possible very accurate measurement of changes in the speed of light in the two arms.

