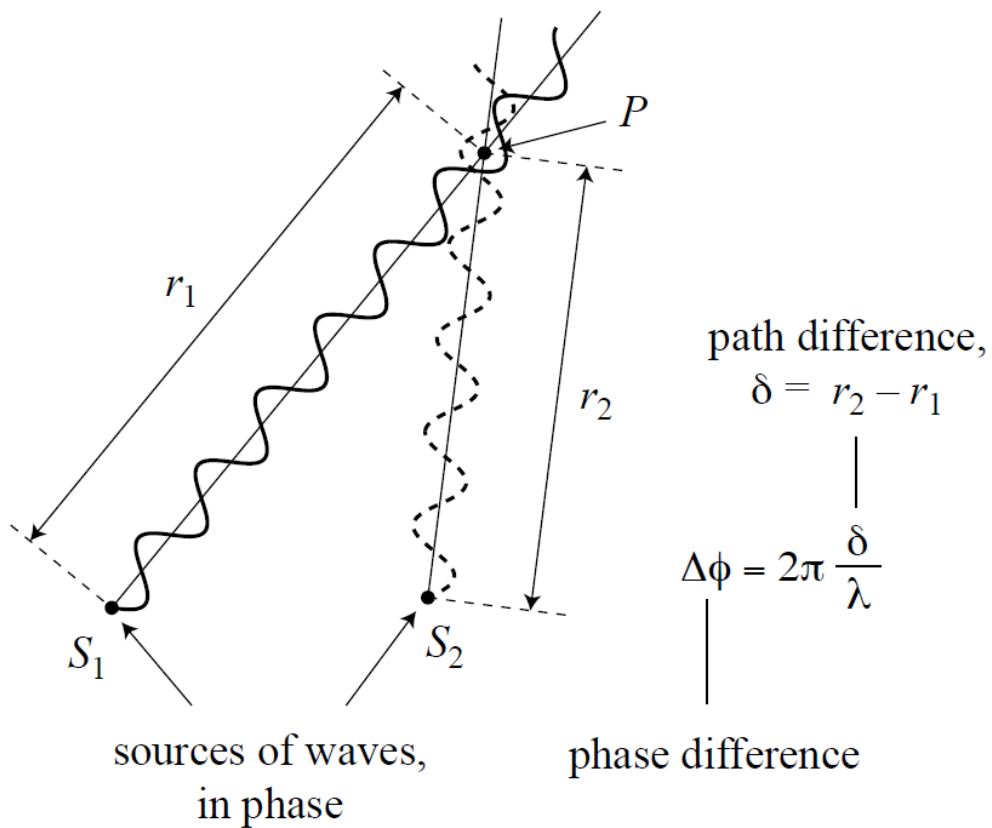


**Answer on Question#38536, Physics, Optics**

How to relate a phase difference and path difference

**Answer**

The phase difference between two waves that were initially in phase is simply proportional to the difference in the respective path lengths traversed by the two waves between their origin and the point at which they interfere.



Define the path length traversed by a wave travelling a distance  $r$  in a medium of refractive index  $n$  as

$$\delta = n \cdot r.$$

Then the phase difference  $\Delta\phi$  of two waves that, after having been in phase initially, have traversed path lengths  $d_1$  and  $d_2$ , respectively, is

$$\Delta\phi = 2\pi \frac{\delta}{\lambda}$$

where  $\delta$  is now the path difference

$$\delta = d_2 - d_1.$$