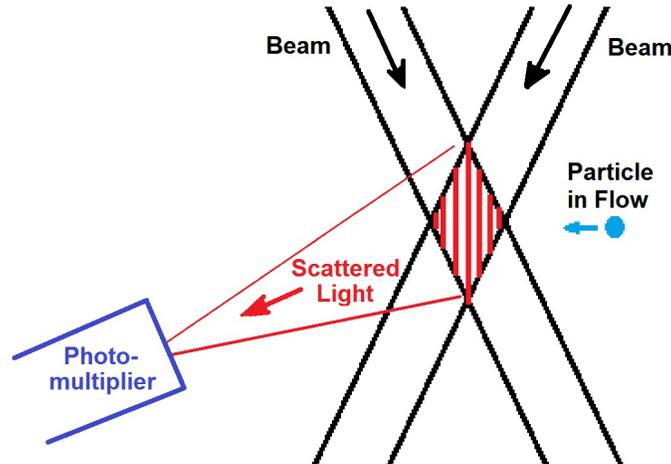


Solution to Problem 510A:

We seek the relation between the velocity, U , of the light-scattering particles in a Laser Doppler Velocimeter and the measured frequency, f , of the scattered light if the wavelength of the laser light is λ and the two laser beams intersect at an angle θ :



The interference pattern (shown in red) in the focal volume where the laser beams meet has a wave spacing of length, ℓ , where by geometry

$$\ell = \frac{\lambda}{2 \sin(\theta/2)} \quad (1)$$

and therefore the frequency of the scattered light produced when a particle traverses this interference pattern at velocity, U , is

$$f = \frac{U}{\ell} = \frac{2U \sin(\theta/2)}{\lambda} \quad (2)$$