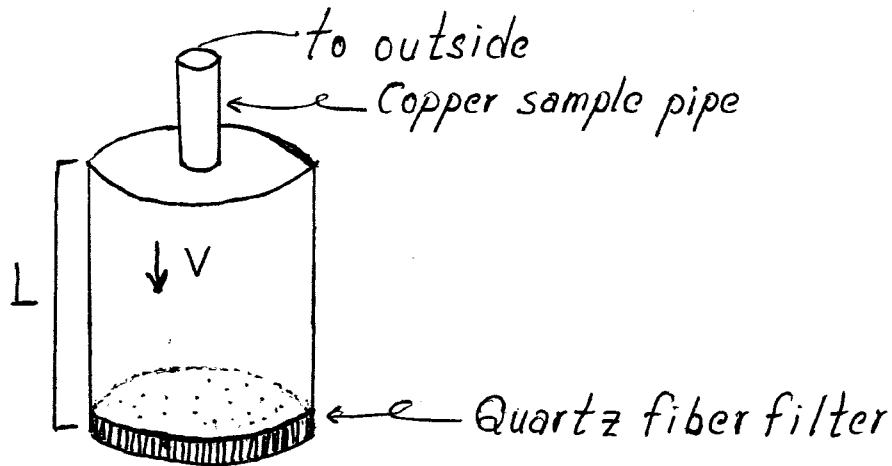


## Basic Optics of Aerosol on filters



$L \equiv$  Column of air sampled  
 $F \equiv$  Air Flow Rate  
 $A \equiv$  Filter Area  
 $V \equiv$  Air Flow Speed  
 $\Delta t =$  Sample time

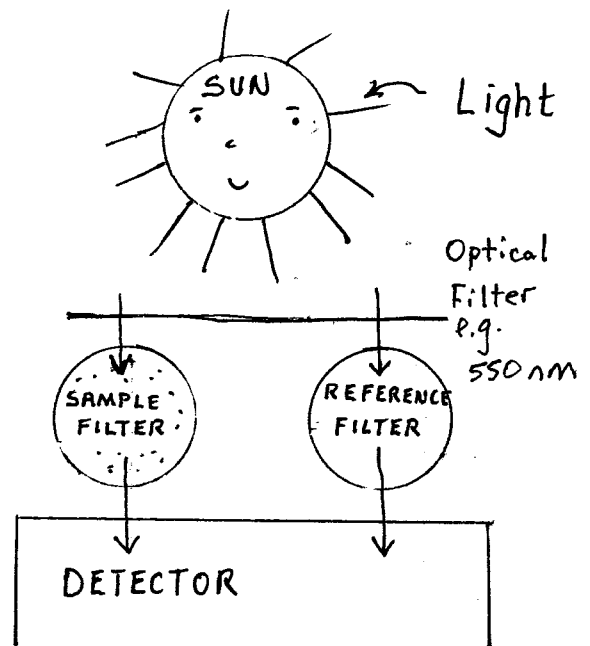
Commercially available instrument where the filter is changed manually: Particle Soot Absorption Photometer (PSAP)

Changed automatically:

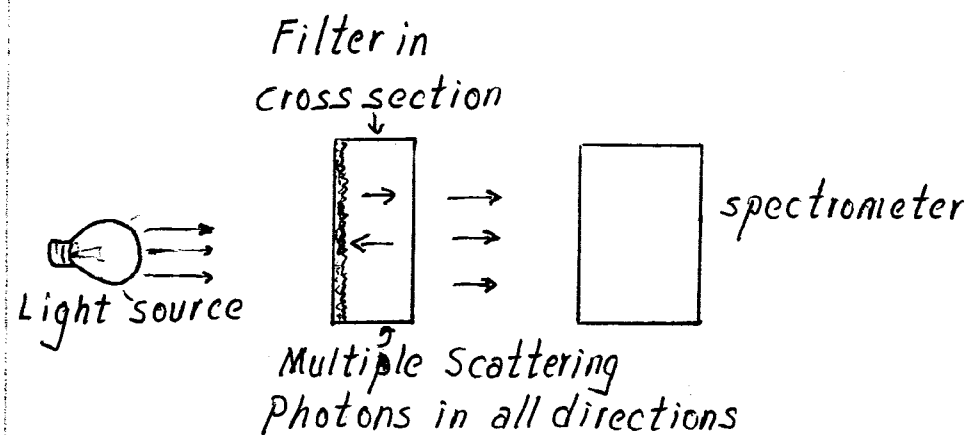
Aethelometer

MAAP

(Multiple Angle Absorption Photometer)



Filter moves manually or automatically.



$S_0(\lambda) = \text{Clean Filter Spectrum}$

$S_1(\lambda) = \text{Dirty Filter Spectrum}$

$$T \equiv \text{Filter Transmission} = S_1/S_0 = e^{-\tau}$$

$\tau \equiv \text{Optical Depth For Particles on Filter}$

$$\tau = -\ln T = 2 \beta_{\text{abs}} L$$

Factor of 2 from multiple scattering

$$\beta_{\text{abs}} = \frac{\tau}{2L} = \frac{\tau A}{2F \Delta t} \quad \left[ \frac{1}{\text{Mm}} \right]$$

$$1 \text{ Mm} = 10^6 \text{ m}$$