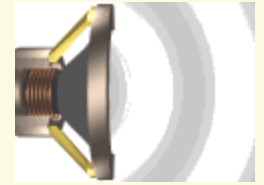
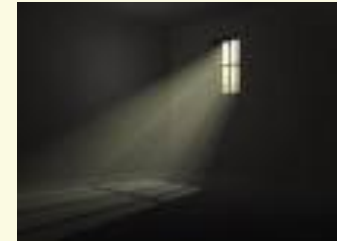


Raios de luz e o movimento da Terra: animação



Aula 18: Partículas e raios de luz

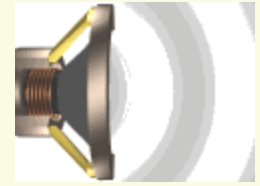
1. Reflexão e refração de ondas (princípio do Huygens)
2. Reflexão e refração de partículas. Princípio de Hamilton
3. Princípio de Fermat e raios de luz



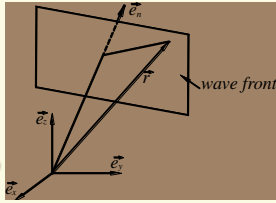
Simulação: princípio de Huygens

Reflexão e transmissão de ondas elásticas: animação

Incidência normal: animação

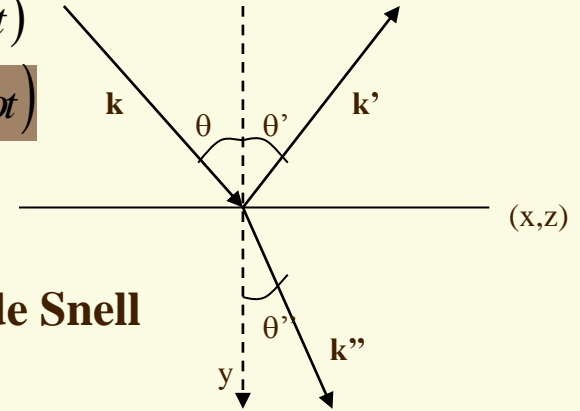


1. Reflexão e refração das ondas

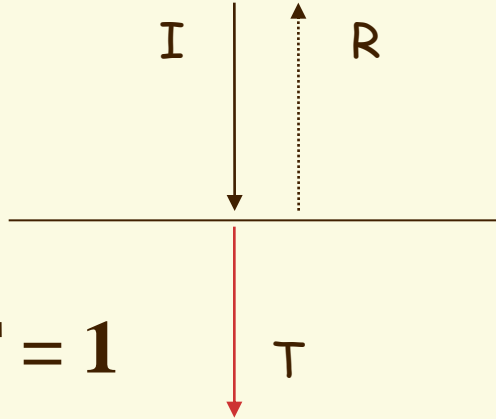


$$\Psi(x, t) = A \sin(kx - \omega t) = A \sin(k \vec{e}_x \cdot \vec{r} - \omega t)$$

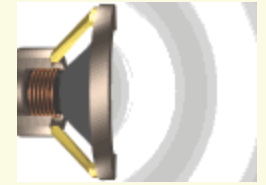
$$\Psi(\vec{r}, t) = A \sin(k \vec{e}_n \cdot \vec{r} - \omega t) = A \sin(\vec{k} \cdot \vec{r} - \omega t)$$



Lei de Snell



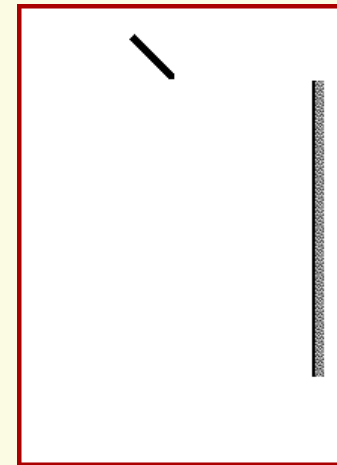
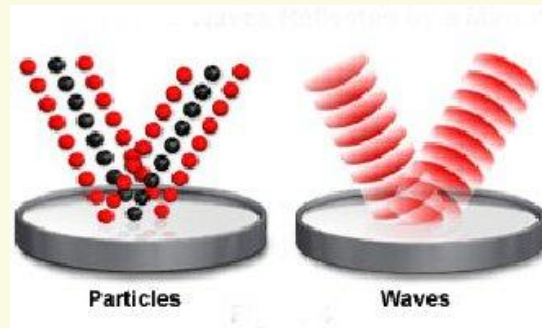
$$R + T = 1$$



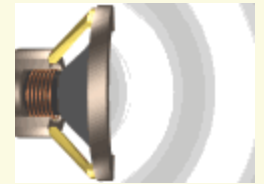
Simulação: reflexão dos raios de luz

Simulação: reflexão de partículas

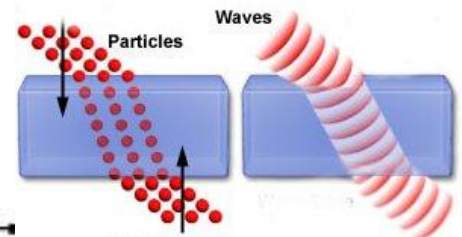
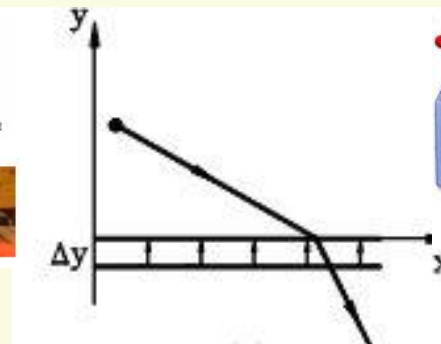
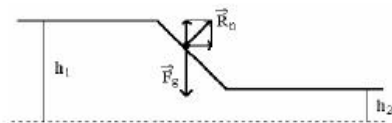
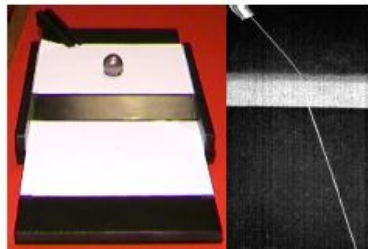
2. Reflexão das partículas e da luz

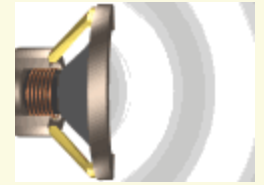


Simulação: experiência de Rutherford



3. Refracção de partículas. Princípio de Hamilton





Simulação: refração dos raios da luz

4. Princípio de Fermat e raios de luz

