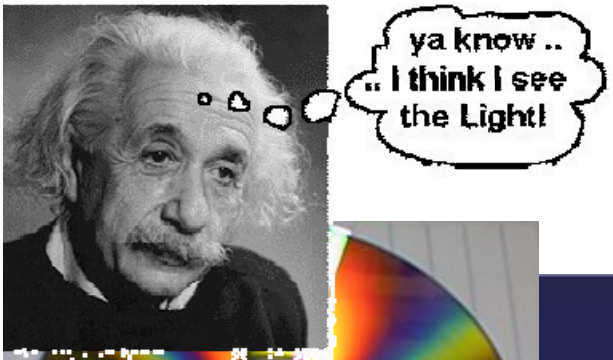
PHY 445 Optics - Spring 2009

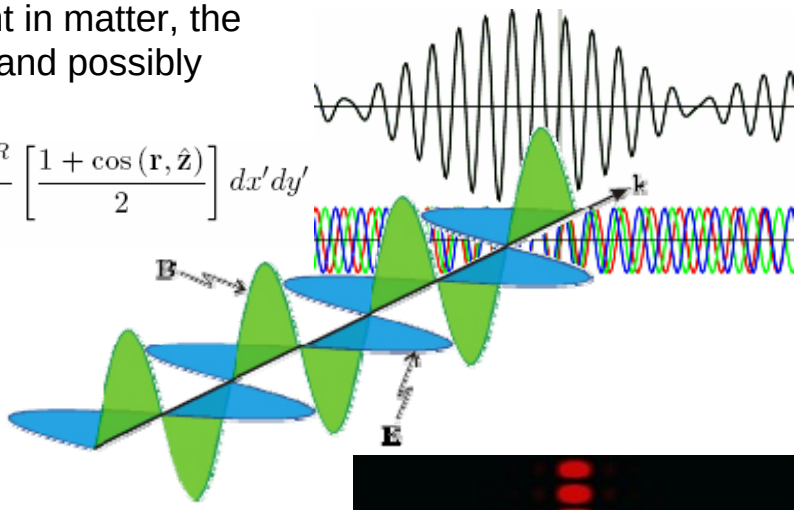
Dr. R. Herman

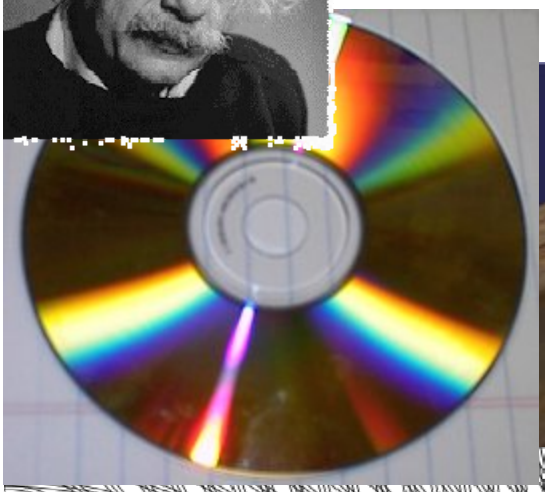
Prerequisite: PHY 202 and MAT 261.

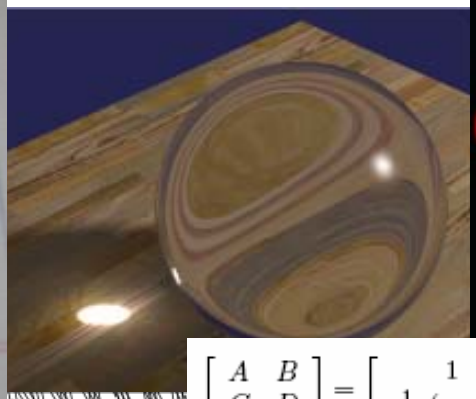
This optics course covers: Physical and geometrical optics. Huygen's principles, electromagnetic theory of light. Within these broad topics we will cover reflection and refraction, dispersion, ray optics and imaging, polarization effects, diffraction, Fourier optics, the propagation of light in matter, the quantum nature of light, holography, and possibly nonlinear optics and lasers.

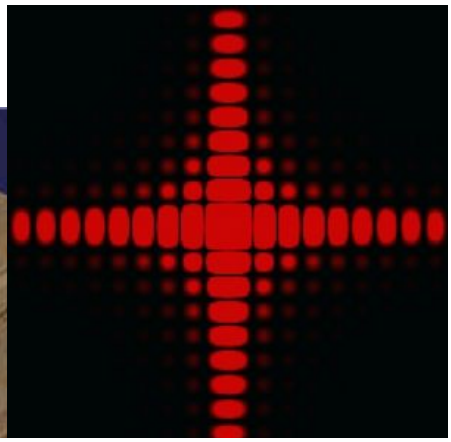
$$E\left(x,y,z=d\right)=-\frac{i}{\lambda}\iint_{\text{aperture}}E\left(x',y',z=0\right)\frac{e^{ikR}}{R}\left[\frac{1+\cos\left(\mathbf{r},\hat{\mathbf{z}}\right)}{2}\right]dx'dy'$$











$$\begin{bmatrix} A & B \\ C & D \end{bmatrix}=\begin{bmatrix} 1 & 0 \\ \frac{1}{R_2}(n-1) & n \end{bmatrix}\begin{bmatrix} 1 & 0 \\ \frac{1}{R_1}\left(\frac{1}{n}-1\right) & \frac{1}{n} \end{bmatrix}$$

$$=\begin{bmatrix} 1 & 0 \\ -(n-1)\left(\frac{1}{R_1}-\frac{1}{R_2}\right) & 1 \end{bmatrix}\qquad\text{(Thin Lens)}$$