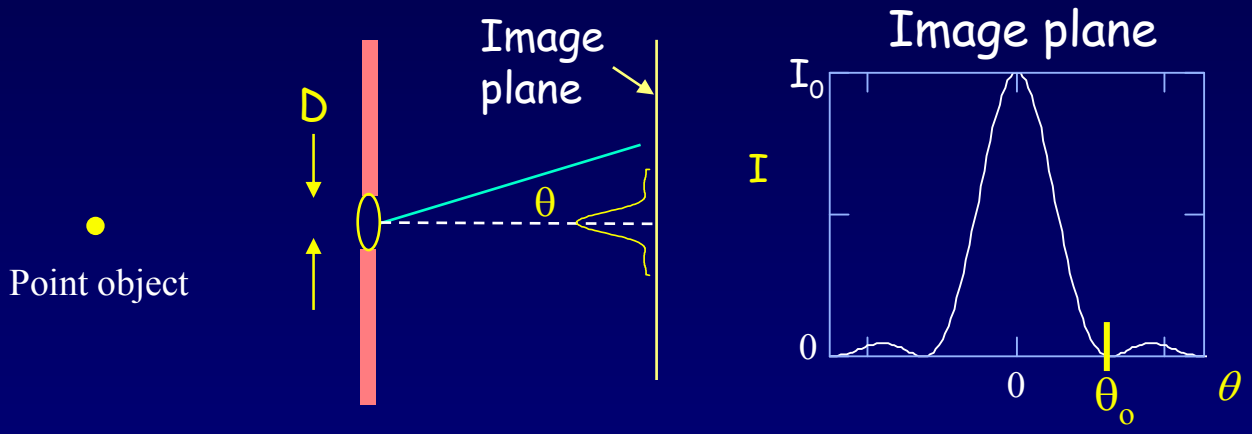
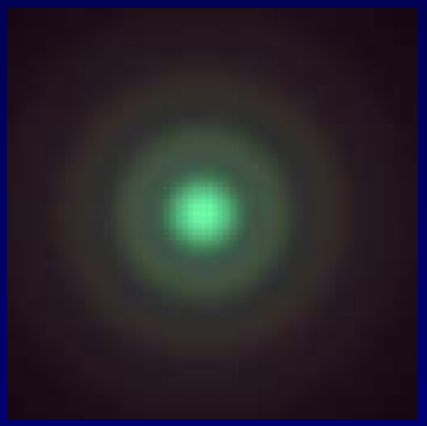
Diffraction-limited Optics

Diffraction has important implications for optical instruments

Even for perfectly designed optics the image of a point source will be a little blurry - the circular aperture produces diffraction.





The "Airy disk".
The central lobe contains 84% of power.

The size of the spot is determined by the diameter, D, of the aperture, and wavelength, λ, of the incident light.

Diffraction by a circular aperture is similar to single-slit diffraction. But note the difference:

Slit	$\theta_0 \approx \frac{\lambda}{a}$
Circular aperture	$\theta_0 \approx 1.22\frac{\lambda}{D}$