Min λ X X X X X

$2x$

Single-slit diffraction pattern

Intensity

$\rightarrow$ D $\leftarrow$

Single slit.

$-2\lambda/D$ $-\lambda/D$ 0 λ/D $2\lambda/D$ $3\lambda/D$ $4\lambda/D$ θ

$$\tan\theta = \frac{y}{D}$$

$$\tan\theta \approx \sin\theta \approx \theta \approx \frac{y}{D}$$

$\theta' \approx \theta$

θ

a

θ'

D

y

δ Condition for minimum

$$a\sin\theta = m\lambda$$

$$y \approx \frac{m\lambda D}{a}$$

SINGLE SLIT INTERFERENCE PATTERN

(SMALL ANGLE APPROX.)

$$y = f \tan \theta \approx f\theta$$

$\theta' \approx \theta$

D

θ'

δ

y

f

θ

CONDITION FOR DESTRUCTIVE INTERFERENCE:

$$\sin \theta = m\frac{\lambda}{D}$$
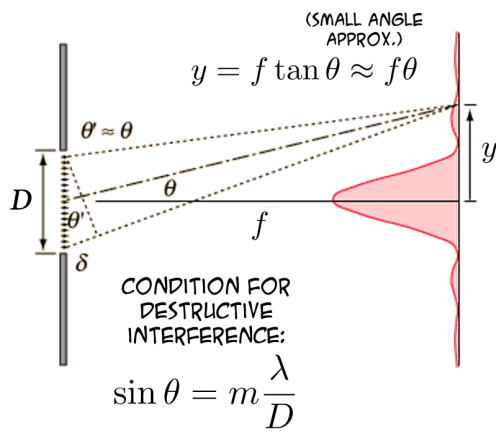
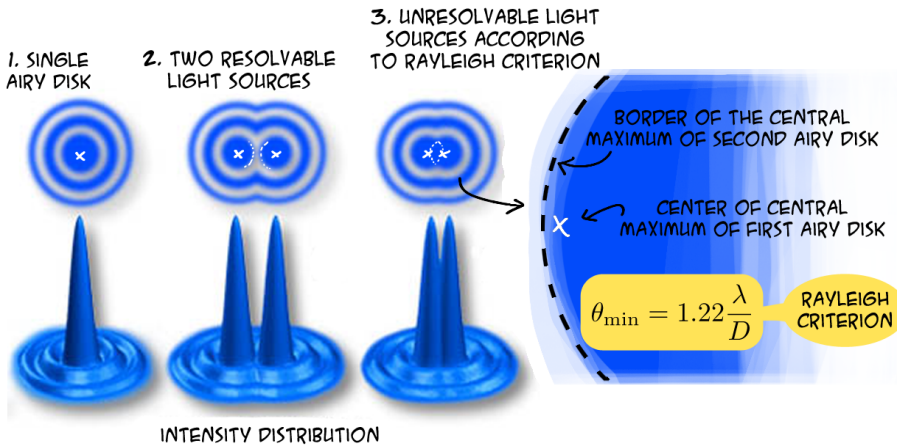## AIRY DISK
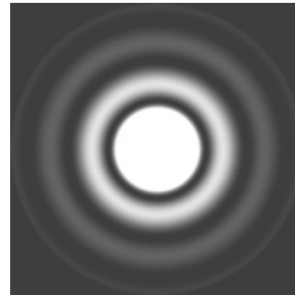
CIRCULAR APERTURE DIFFRACTION PATTERN

well resolved   just resolved   not resolved

The Rayleigh Criterion

Airy Disk 1   Airy Disk 2

Intensity

d_0

X

Figure 4

1. SINGLE AIRY DISK

2. TWO RESOLVABLE LIGHT SOURCES

3. UNRESOLVABLE LIGHT SOURCES ACCORDING TO RAYLEIGH CRITERION

BORDER OF THE CENTRAL MAXIMUM OF SECOND AIRY DISK

CENTER OF CENTRAL MAXIMUM OF FIRST AIRY DISK

$$\theta_{min} = 1.22\frac{\lambda}{D}$$

RAYLEIGH CRITERION

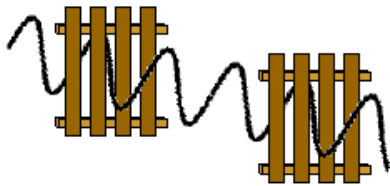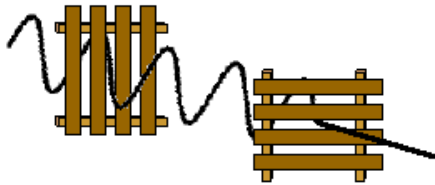INTENSITY DISTRIBUTION

2
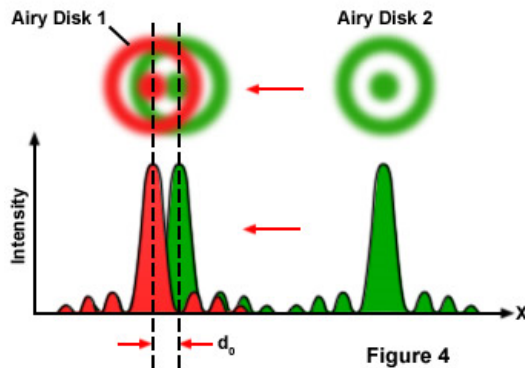
The Picket Fence Analogy

When the pickets of both fences are aligned in the vertical direction, a vertical vibration can make it through both fences.

When the pickets of the second fence are horizontal, vertical vibrations which make it through the first fence will be blocked.

unpolarized light

glasses transmit only vertically polarized light

glare greatly reduced

direct light not reduced as much as glare

light partially polarized in the horizontal plane by reflection