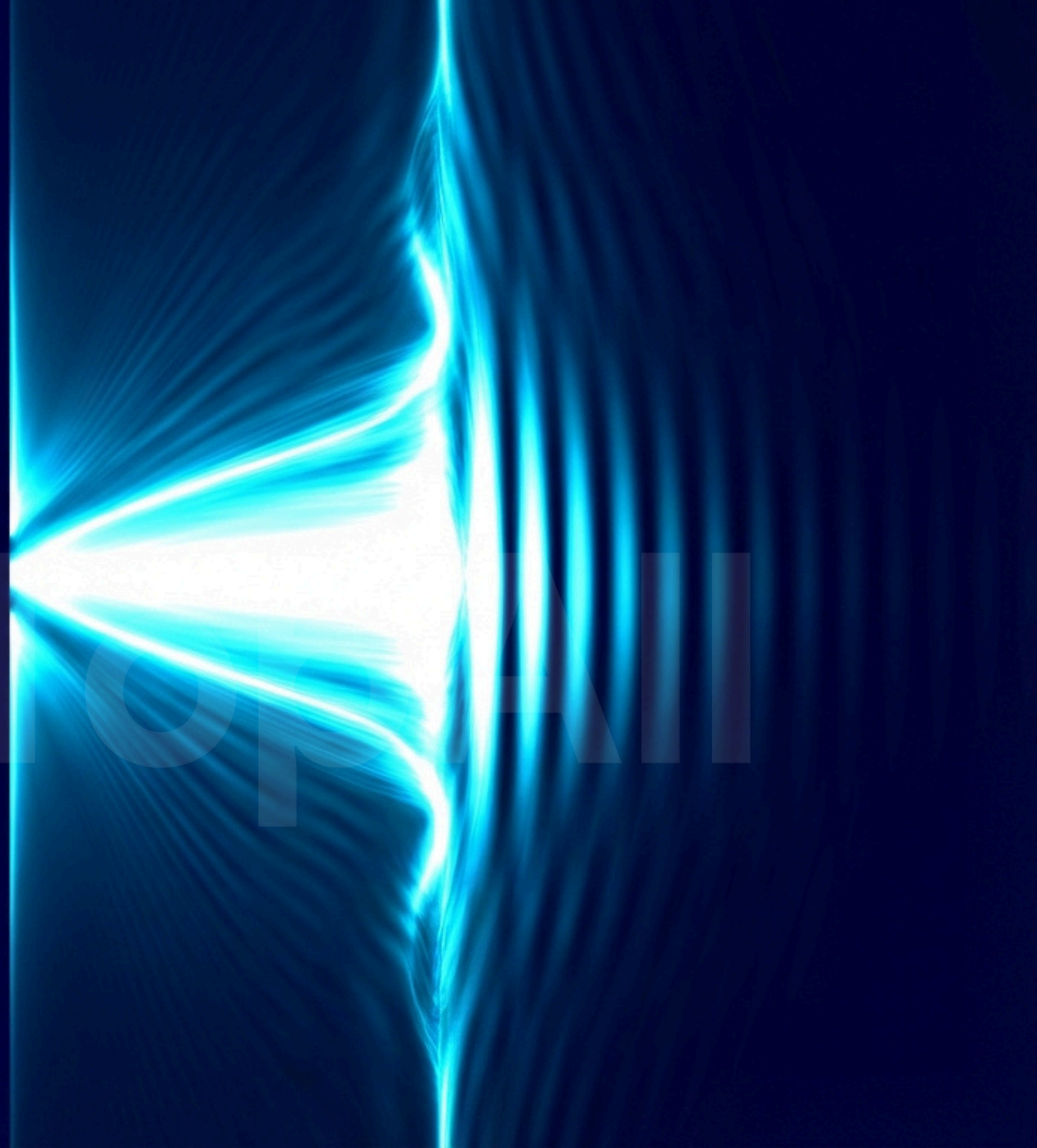




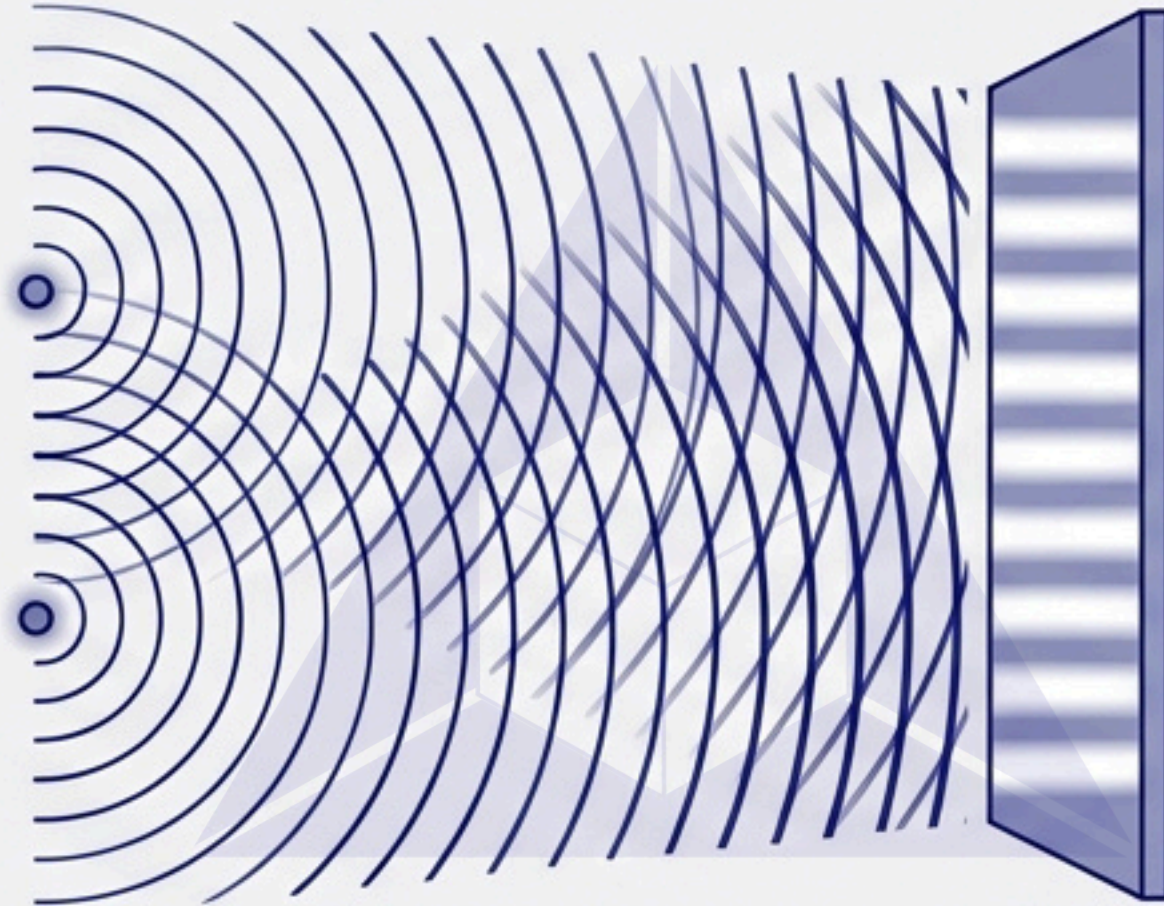
Single Slit Diffraction

Why one narrow slit
produces a full pattern



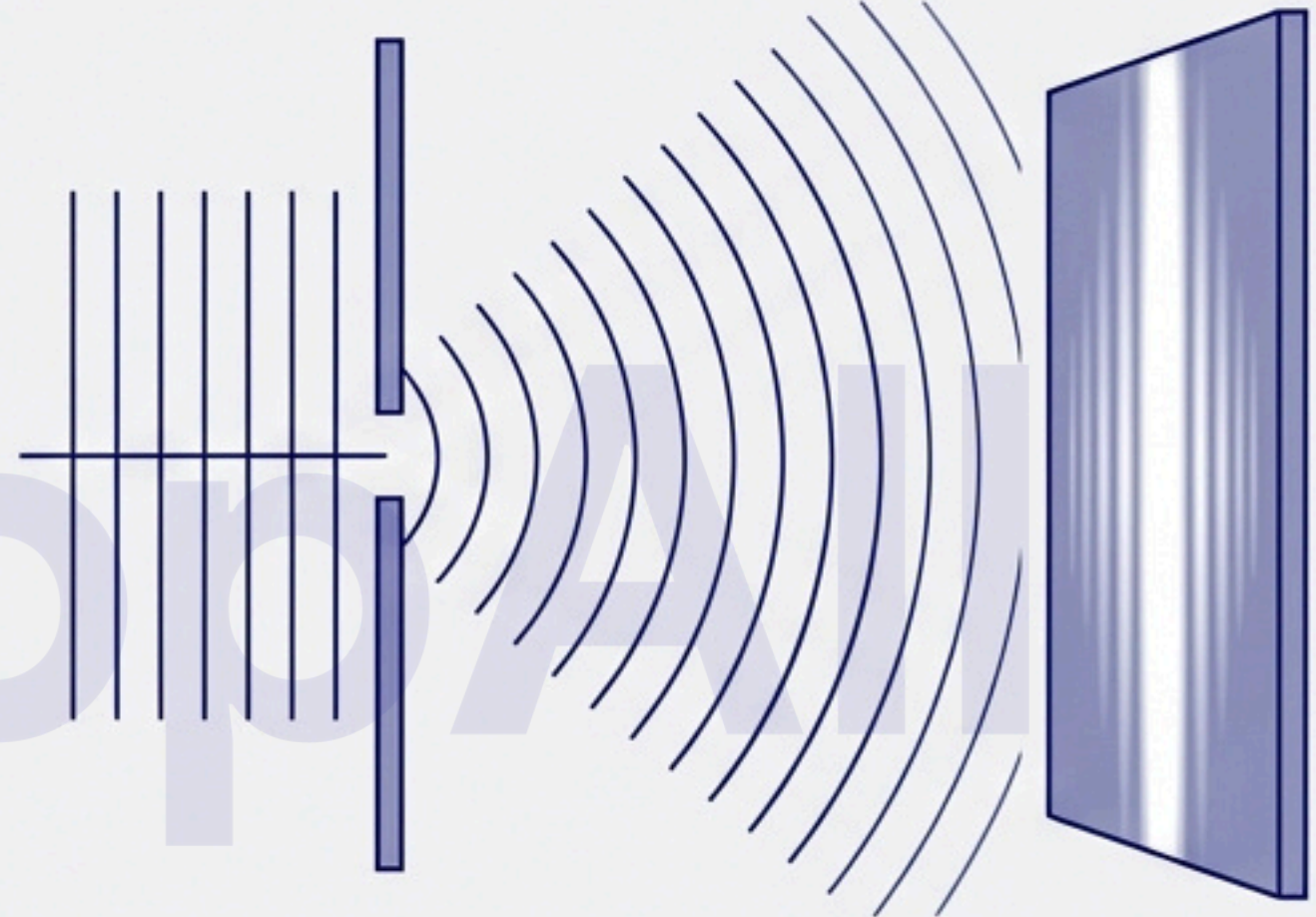
From Young to a Single Slit

Double Slit Interference



Young's Double Slit: Two distinct point sources interfere to create uniform fringes.

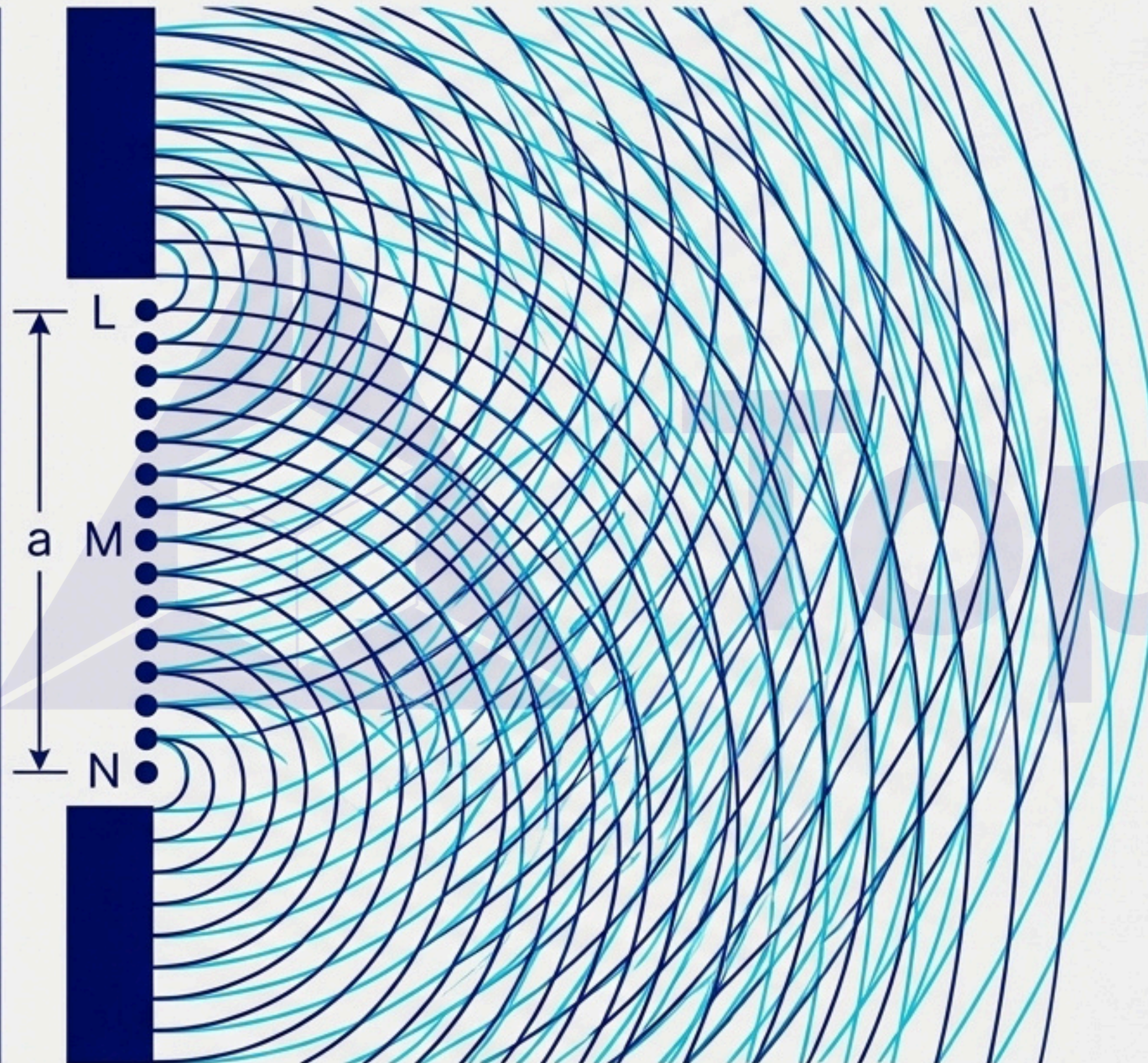
Single Slit Diffraction



The Single Slit: One narrow opening causes the wavefront to bend, spreading light into the shadow region.

Key Takeaway: Light doesn't just pass through empty space; the narrow slit itself interacts with the wave.

Huygens' Principle: The Wavelet Engine



The Intuitive Picture

According to Huygens' principle, the slit is not just a window—it is a canvas of new light sources.

An incoming parallel wavefront arrives in phase.

Every point across the slit width (a) becomes a secondary source.

These infinite secondary wavelets spread forward and overlap.



**You've Learned the Theory.
Let's Test Them Now.**

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

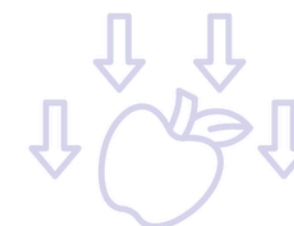
Practice Now



[At prep.topall.app](https://prep.topall.app)

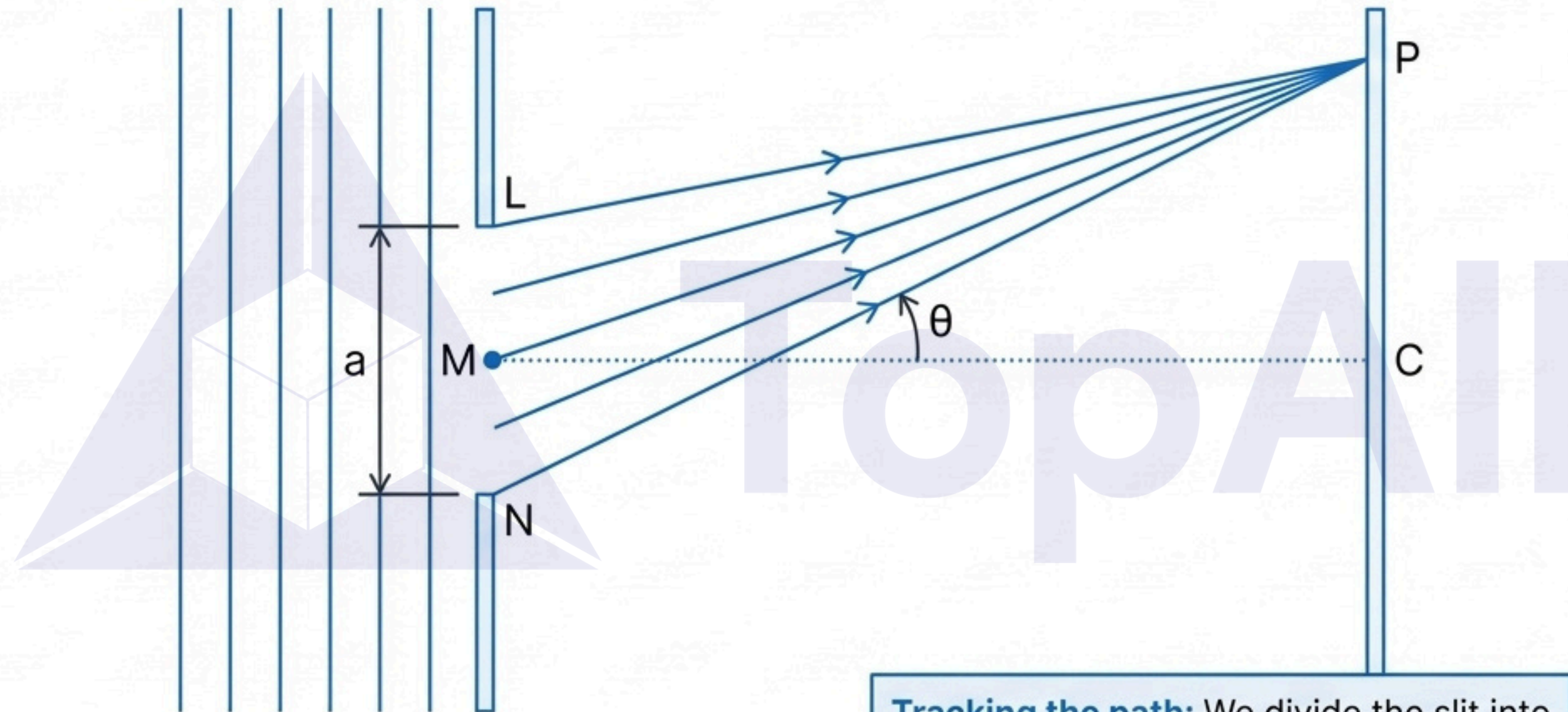


Key Highlights



- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter

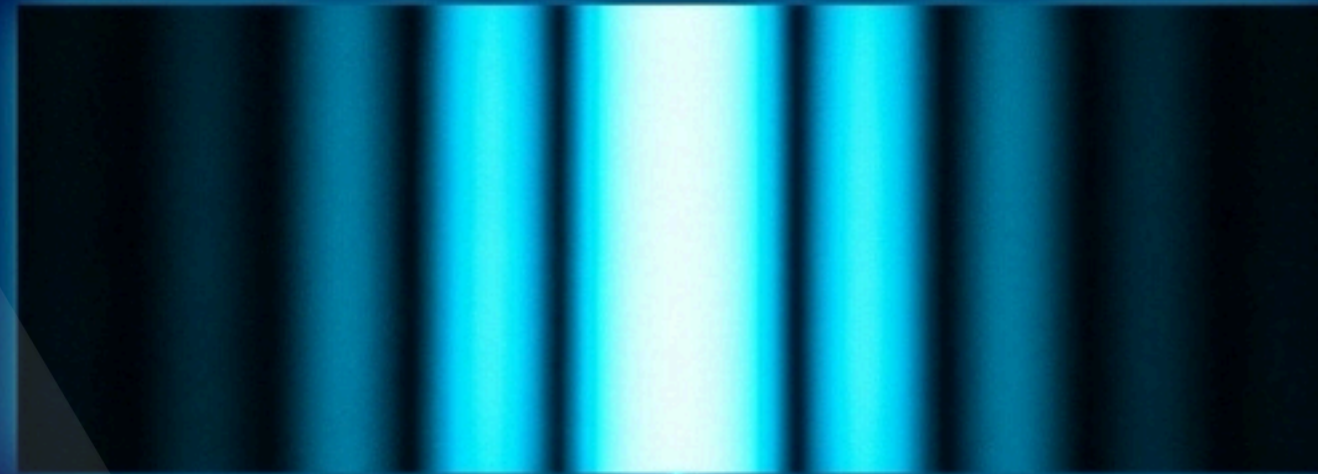
Diffraction Through a Narrow Slit



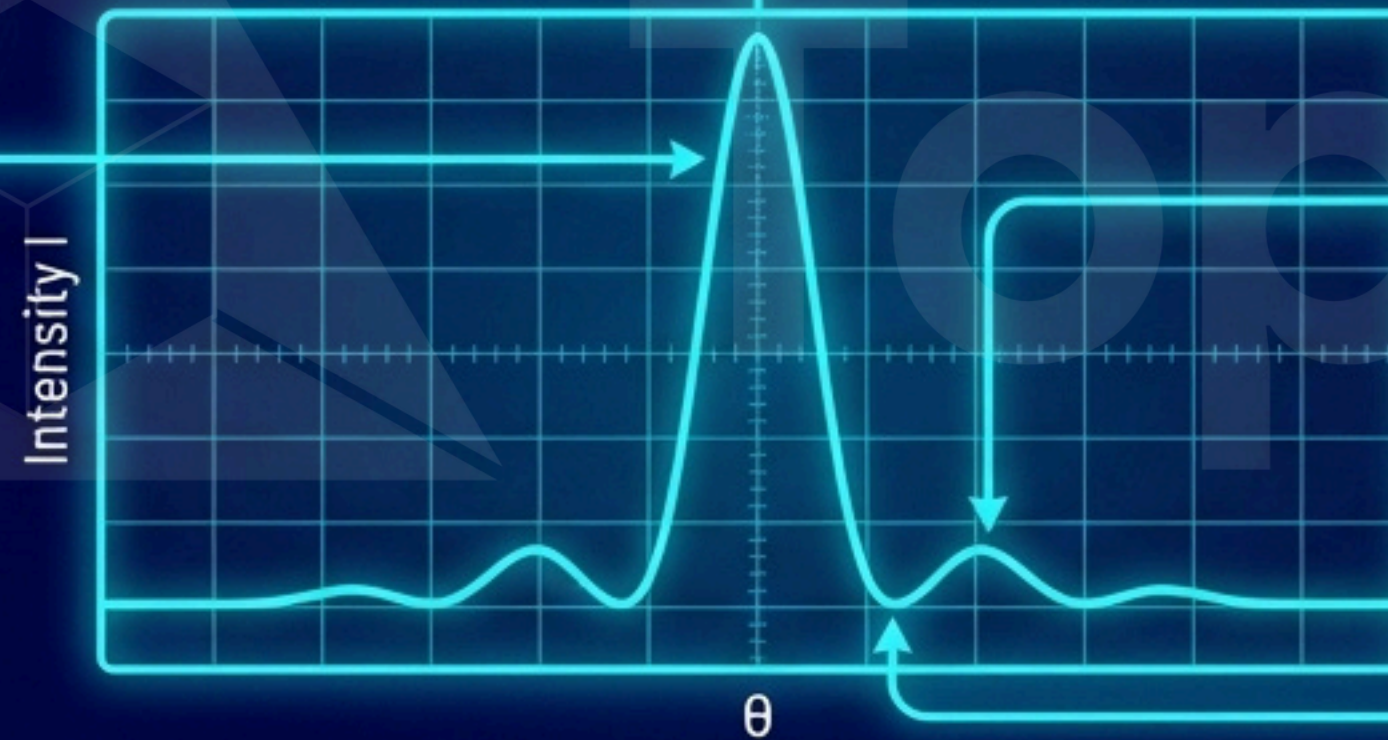
Tracking the path: We divide the slit into smaller parts and track their parallel paths to point P at angle theta.



Pattern on Screen



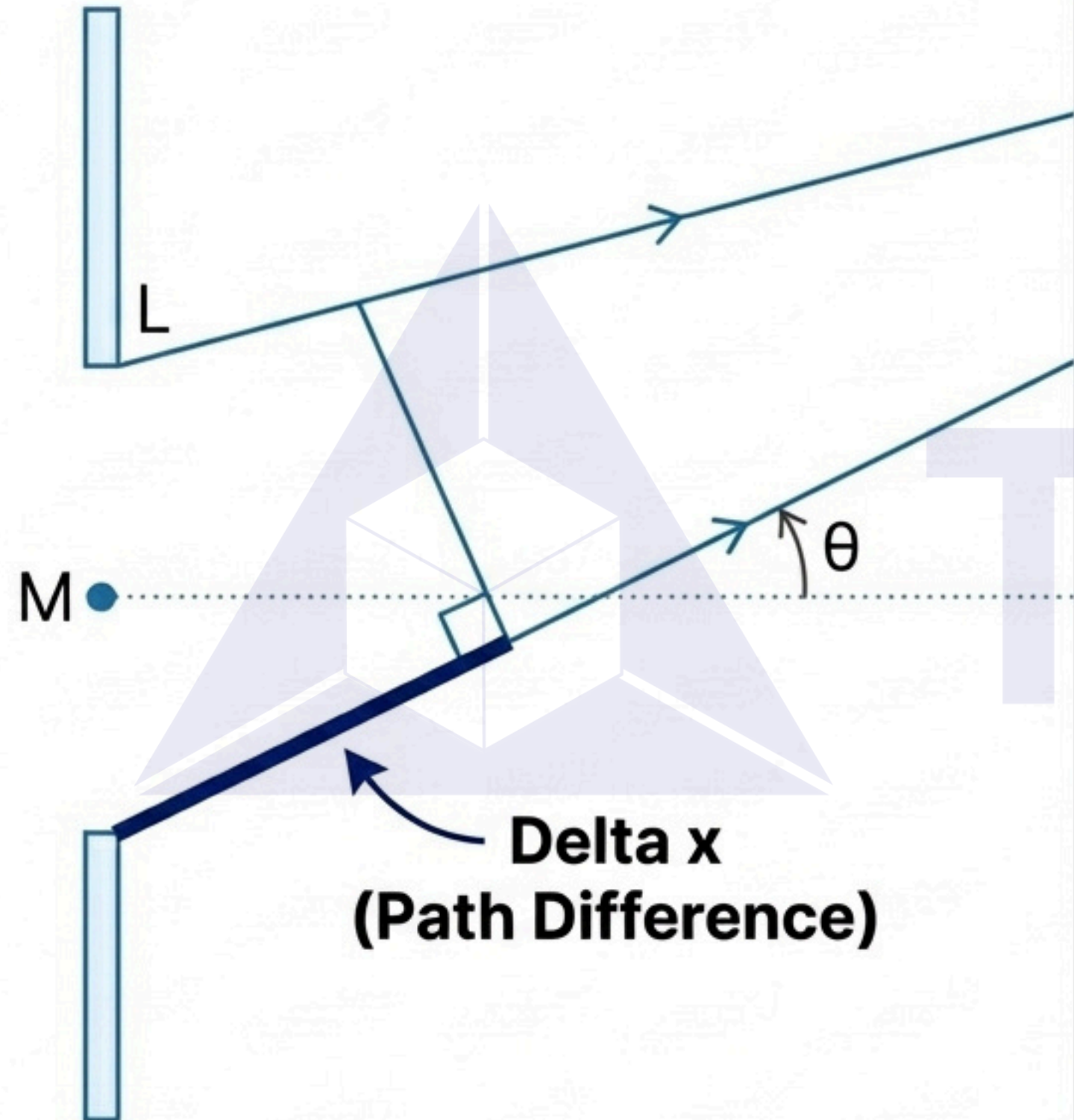
Central Maximum:
Widest and brightest.
Occurs at $\theta = 0$ where
all secondary wavelets
arrive in phase.



Secondary Maxima:
Progressively weaker
bright bands at θ
approx $(n+1/2)\lambda/a$.

Dark Minima: Regions of
zero intensity located at θ
 $= n\lambda/a$ ($n = 1, 2, \dots$).

Why It Happens



The Secret: Internal Interference

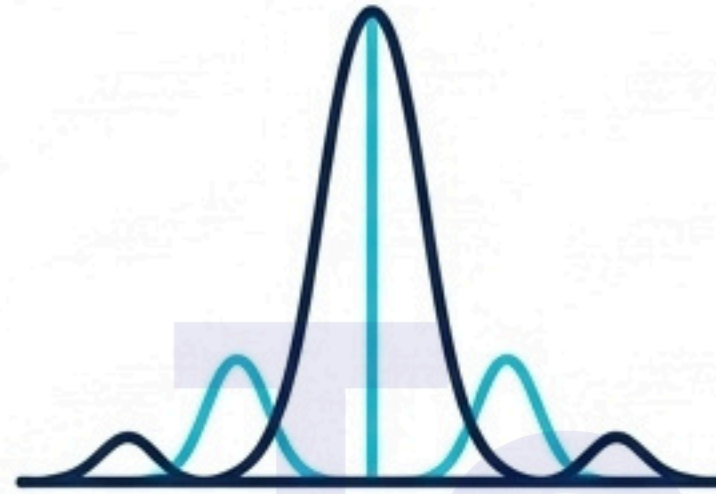
- 1** The single slit pattern is actually an interference pattern.
- 2** Different parts of the same wavefront interfere with one another.
- 3** At specific angles, the path difference causes light from the top half of the slit to perfectly cancel out light from the bottom half, creating a dark minimum.

Key Takeaways



Structured Patterns

A single narrow slit does not cast a sharp geometric shadow. It acts as an array of secondary sources, spreading light to create alternating bright and dark bands.



The Dominant Center

The pattern is defined by a massive Central Maximum that is significantly wider and intensely brighter than all subsequent secondary maxima.



Proof of the Wave

Diffraction provides definitive proof of the wave nature of light, demonstrating that light bends around corners and interferes with itself.



You've Learned the Theory.

Now Let's Test It.

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