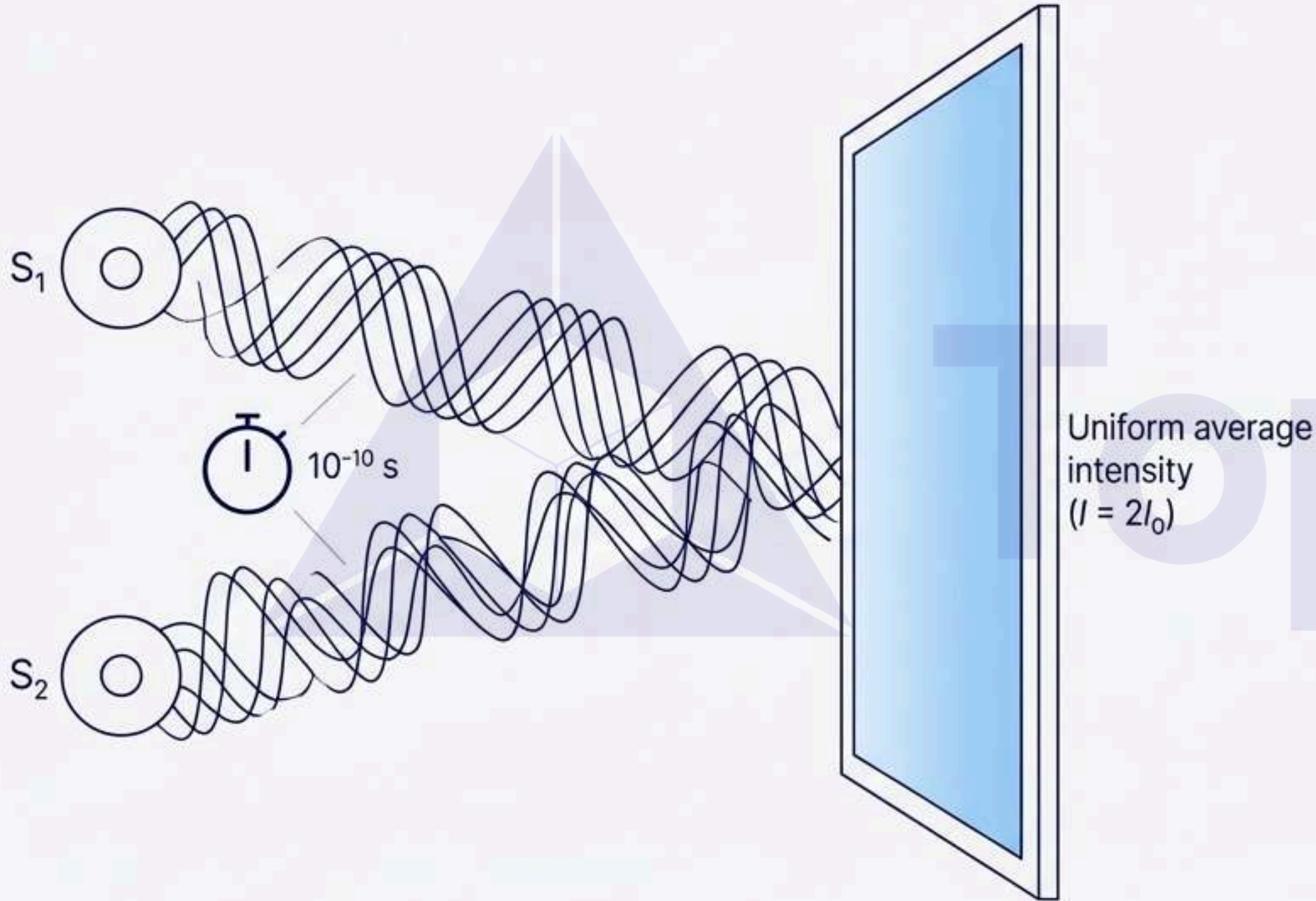




Young's Double Slit Experiment

The classic proof that
light is a wave

Why Two Sodium Lamps Fail



The Problem

Independent Sources

Two distinct light sources emit waves with no fixed phase relationship.

The Mechanism

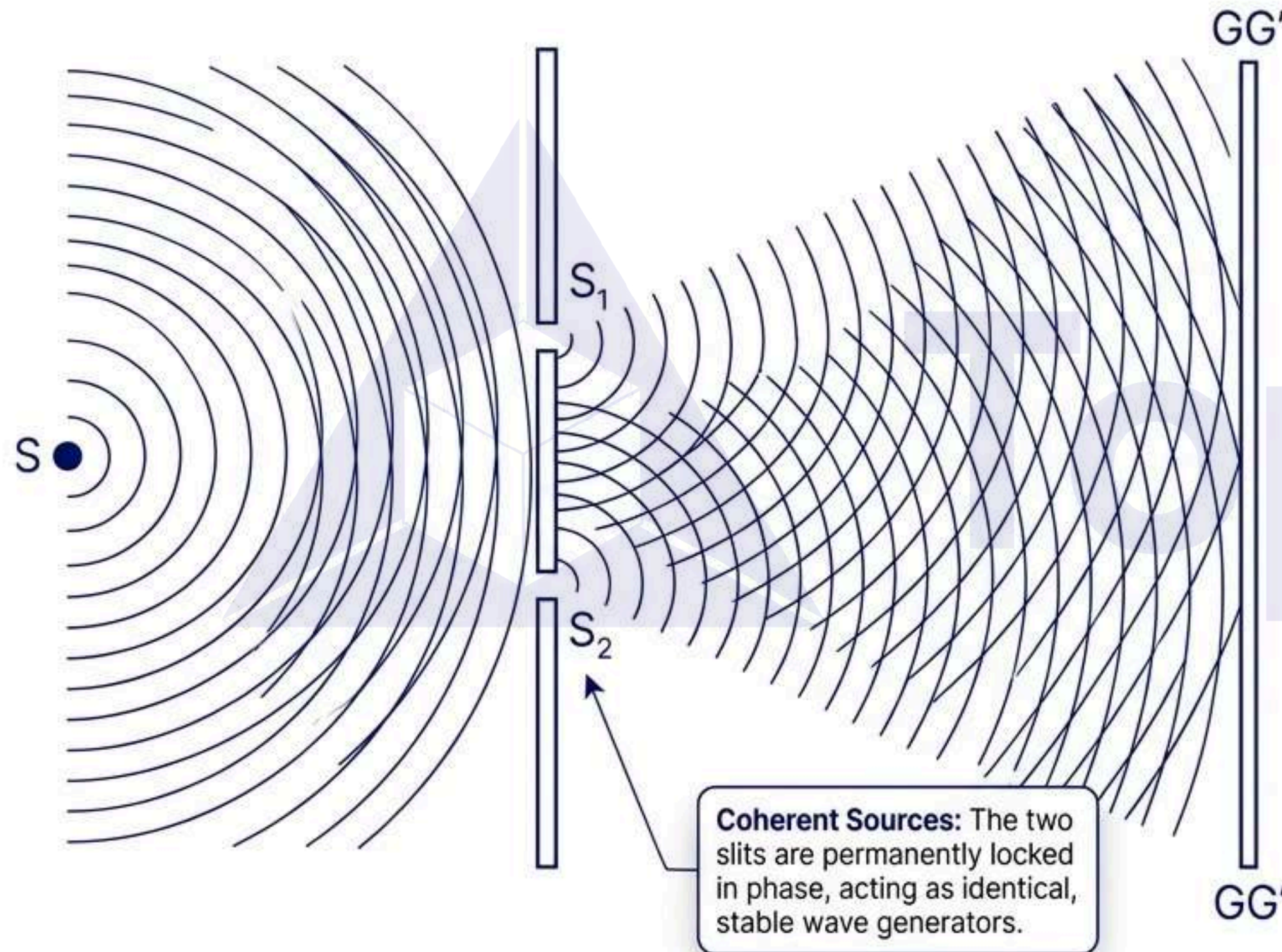
Abrupt Phase Changes

Ordinary light sources undergo random phase shifts in times of the order of 10^{-10} seconds.

Key Takeaway: Incoherent Light

The rapid, random changes prevent stable interference. The screen just shows a uniform average intensity, not distinct fringes.

Young's Clever Setup: Phase Locking



Step 1: A Single Origin

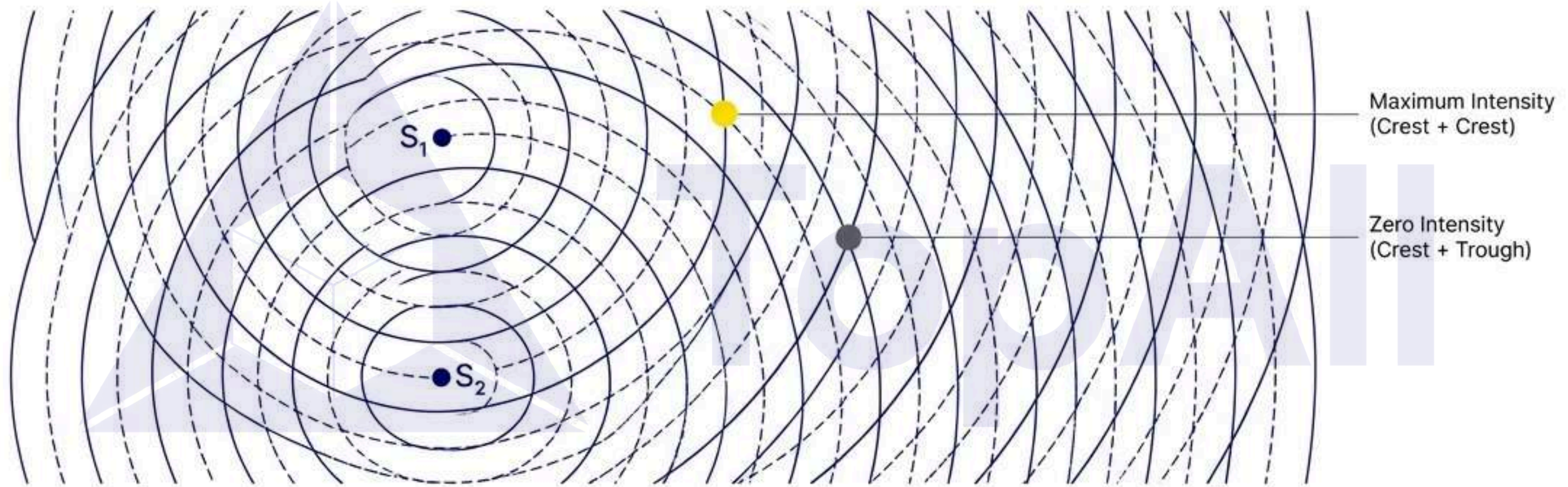
Light from a single bright source S illuminates two closely spaced pinholes, S_1 and S_2 .

Step 2: Derived Coherence

Because S_1 and S_2 derive their light from the exact same original wave front, any abrupt phase change in S happens to both simultaneously.

The Formation of Fringes

As the coherent spherical waves overlap, their displacements combine via the superposition principle.



Constructive interference creates bright bands, while destructive interference creates dark bands on the viewing screen.



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

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

Practice Now



At 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

The Bright Fringe Condition

Constructive Interference

x_n : Distance from the central maximum on the screen

n : Integer order (0, ± 1 , ± 2 , ...)

$$x_n = \frac{n \cdot D \cdot \lambda}{d}$$

λ : Wavelength of the incident light

D : Distance from slits to the screen

d : Distance between the two slits S_1 and S_2

The Dark Fringe Condition

Destructive Interference

x_n : Distance from the central maximum on the screen

n : Integer order
(0, ± 1 , ± 2 , ...)

The half-integer shift ensures the waves arrive exactly out of phase (crest meets trough).

$$x_n = \frac{\left(n + \frac{1}{2}\right) \cdot (D \cdot \lambda)}{d}$$

λ : Wavelength of the incident light

D : Distance from slits to the screen

d : Distance between the two slits S_1 and S_2

Fringe Pattern and Spacing

Equations for both bright and dark bands confirm that the interference fringes are equally spaced across the screen.



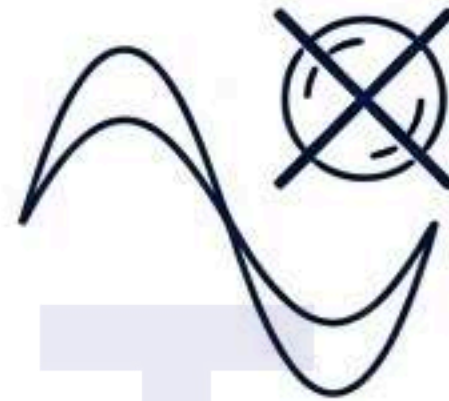
Variables Dashboard			
↑	Wavelength (λ)	→	↑ Spacing
↑	Screen Distance (D)	→	↑ Spacing
↓	Slit Separation (d)	→	↑ Spacing

Key Takeaways



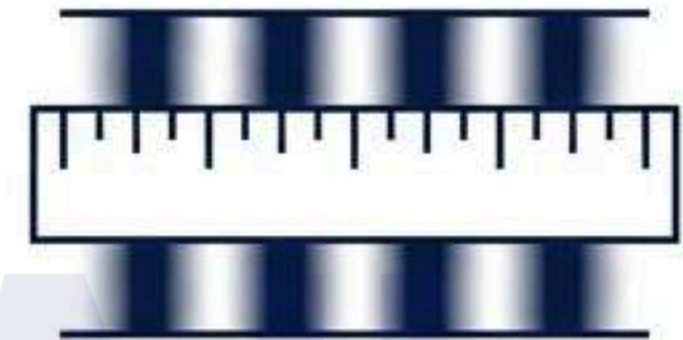
Coherence is Required.

Young's split-source setup overcomes the random phase changes of ordinary light, creating two perfectly phase-locked (coherent) sources.



Proof of the Wave Model.

The existence of stable bright and dark bands can only be explained by the superposition of overlapping waves, dealing a definitive blow to the particle theory of light.



Predictable Geometry.

Bright ($n\lambda$) and dark ($(n + 0.5)\lambda$) fringes alternate in an equally spaced pattern dictated by wavelength, slit separation, and screen distance.



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis