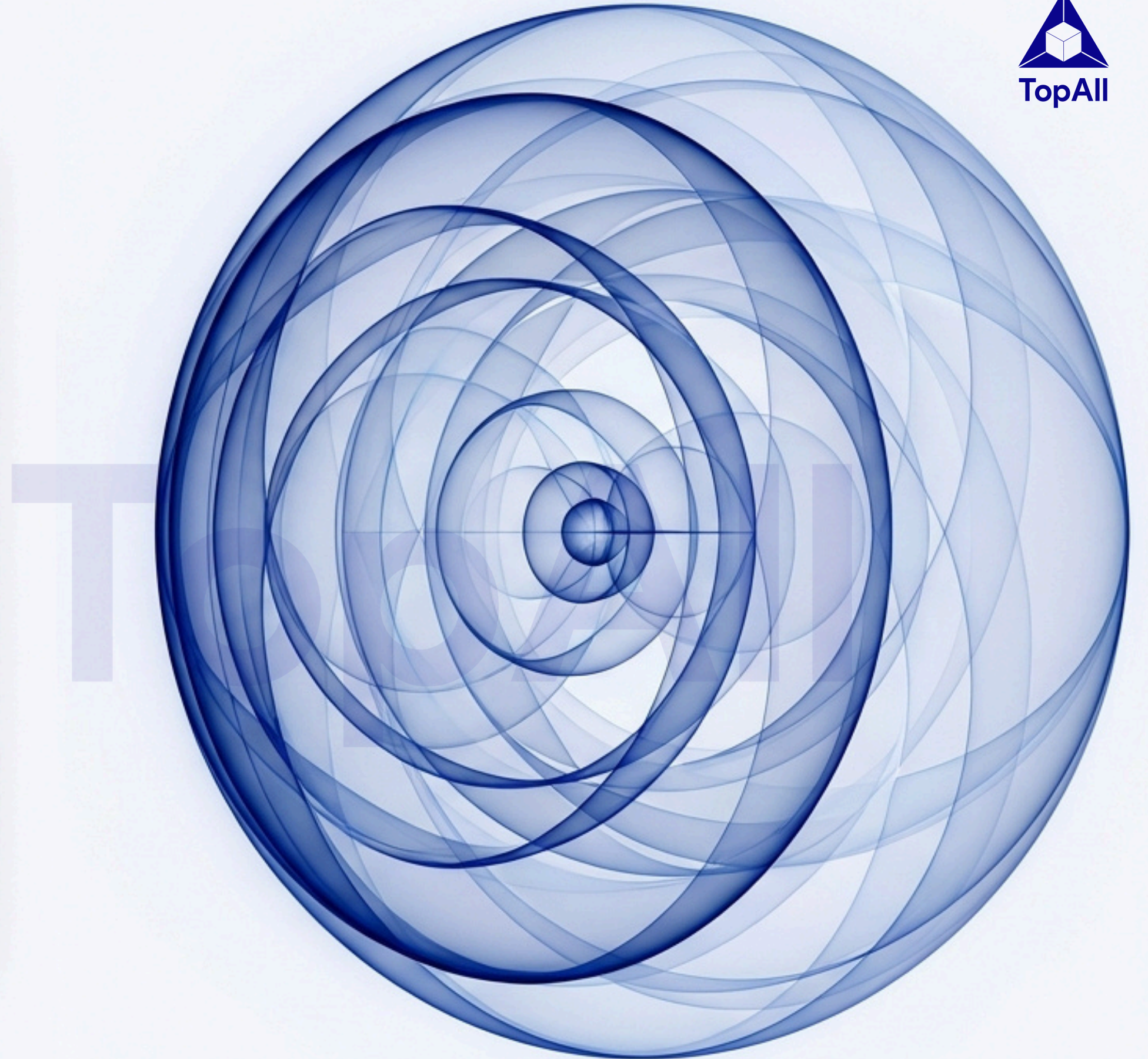


Huygens Principle

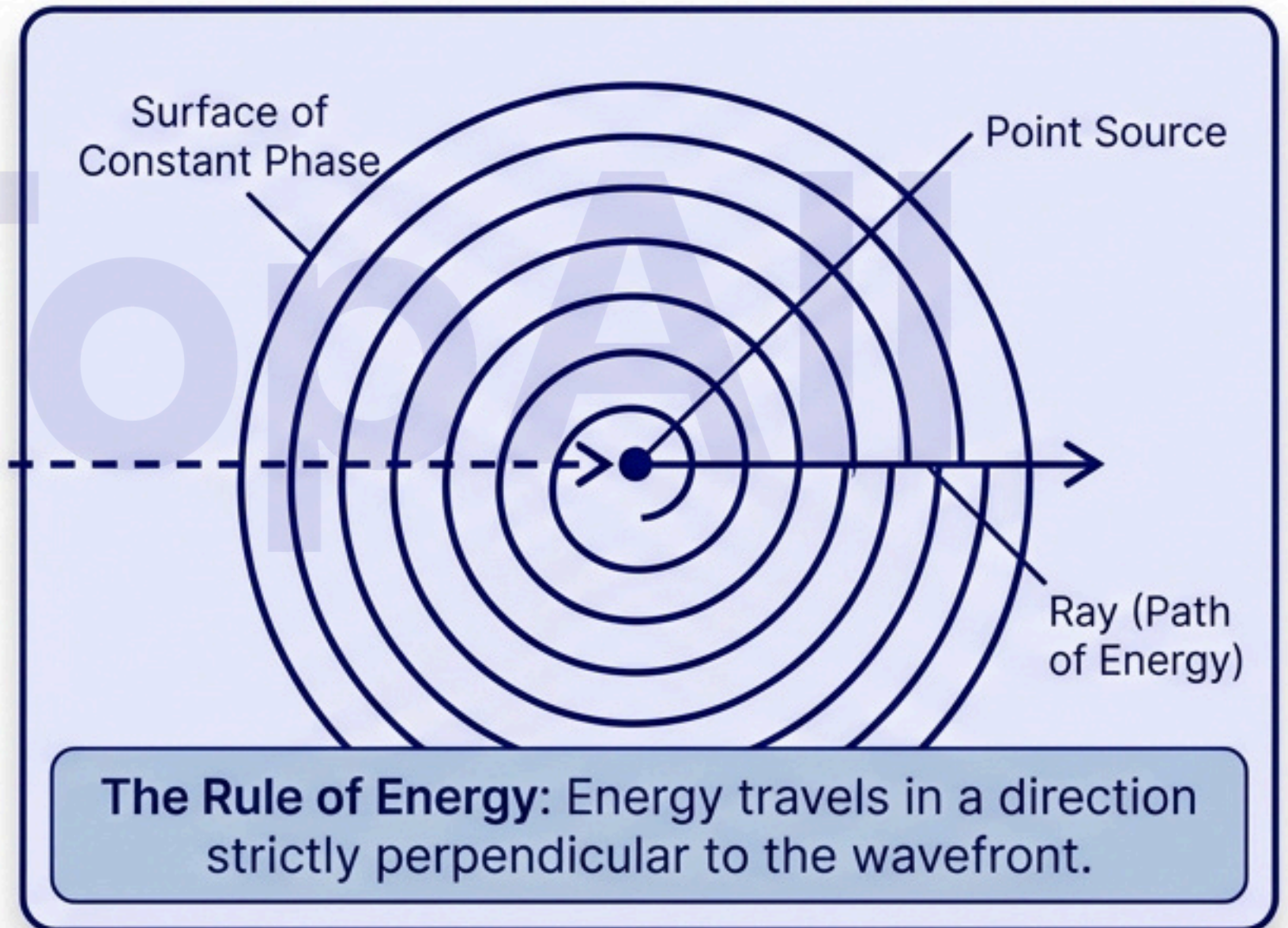
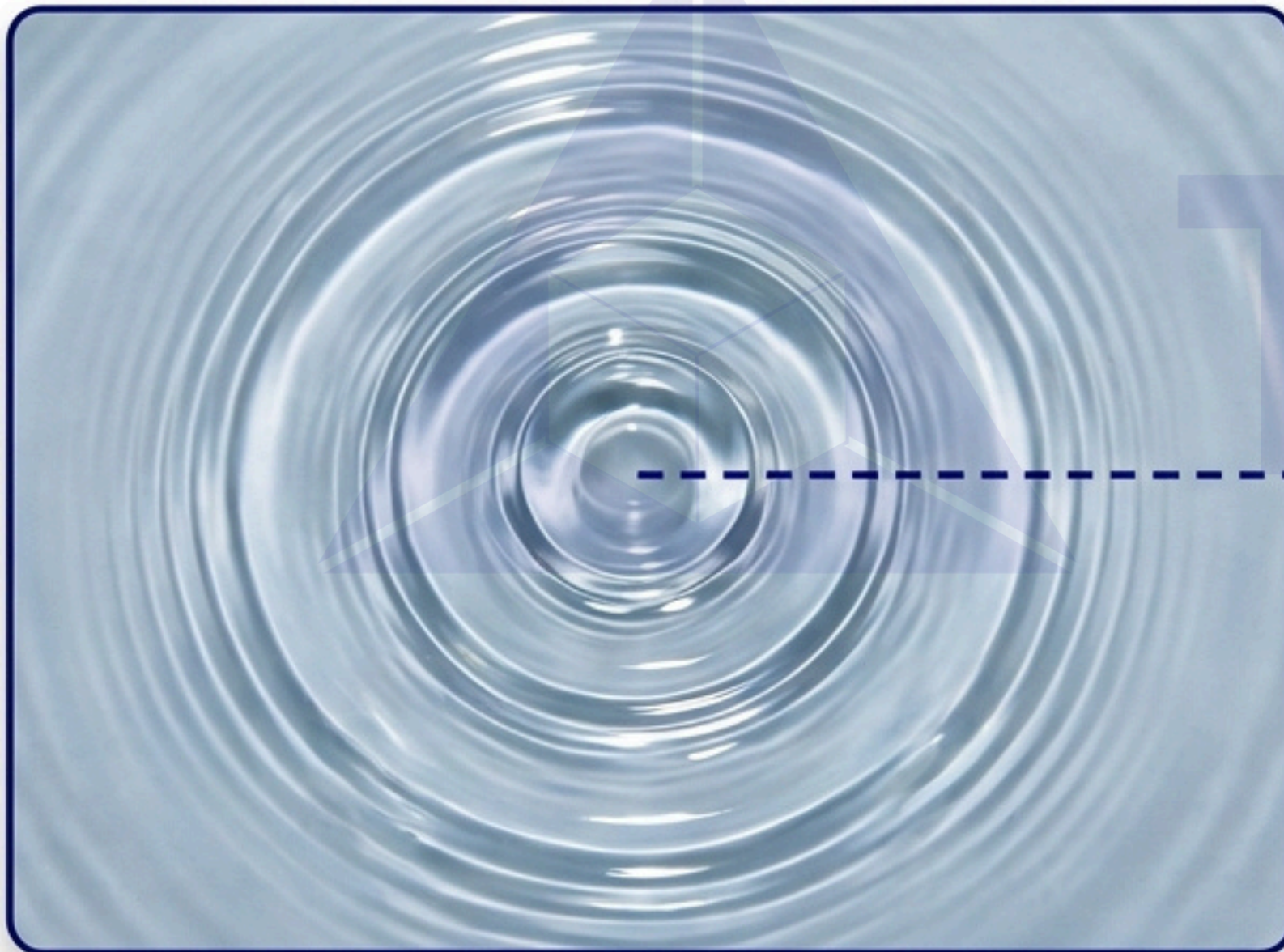
How wavefronts
move forward

Class 12 Physics • Wave Optics



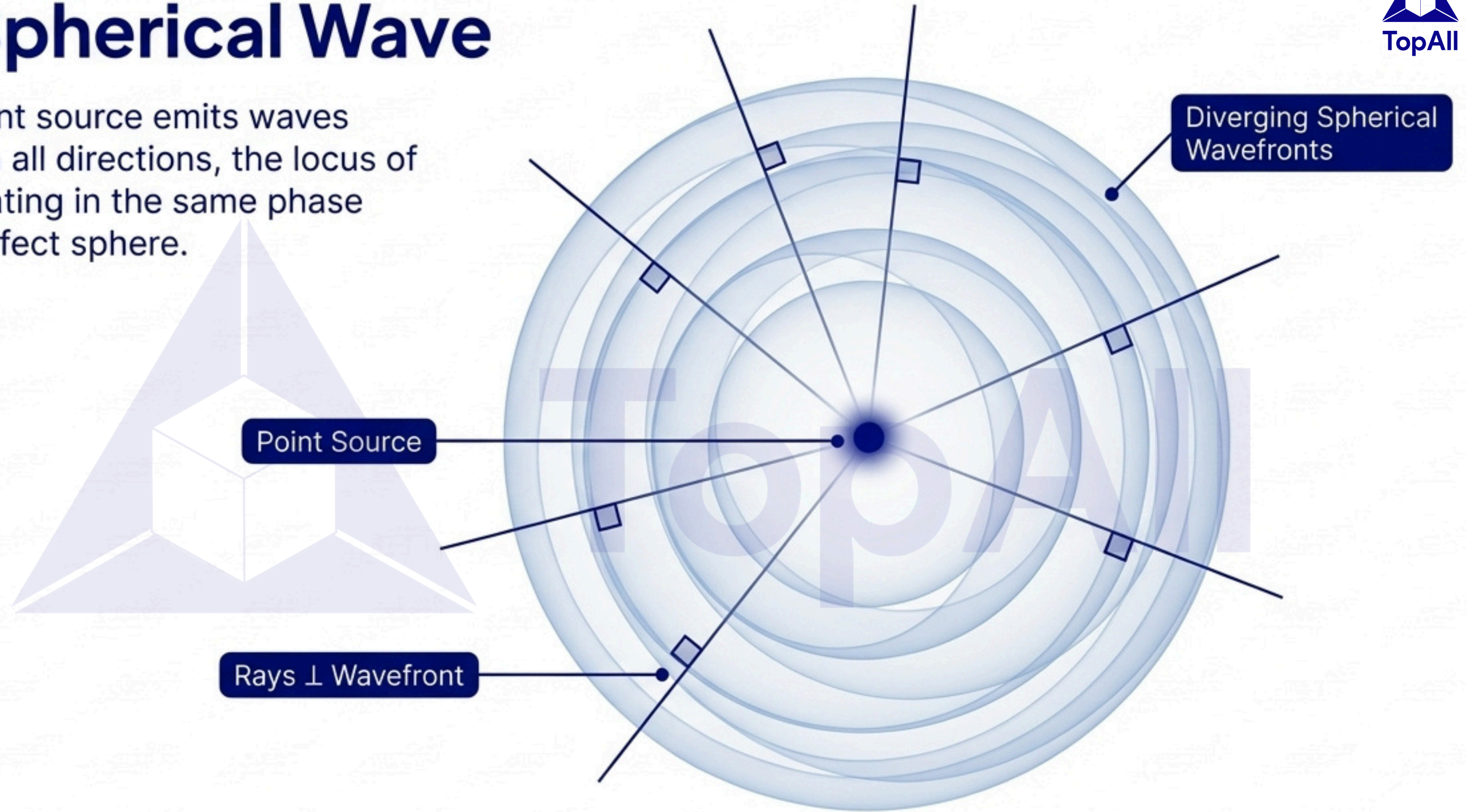
Defining the Wavefront

A wavefront is defined as a surface of **constant phase**. Every point on this surface oscillates in exact sync.



The Spherical Wave

When a point source emits waves uniformly in all directions, the locus of points vibrating in the same phase forms a perfect sphere.





$$E=mc^2$$



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

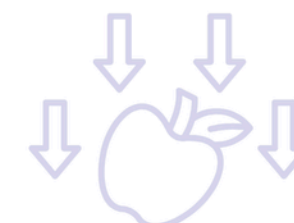
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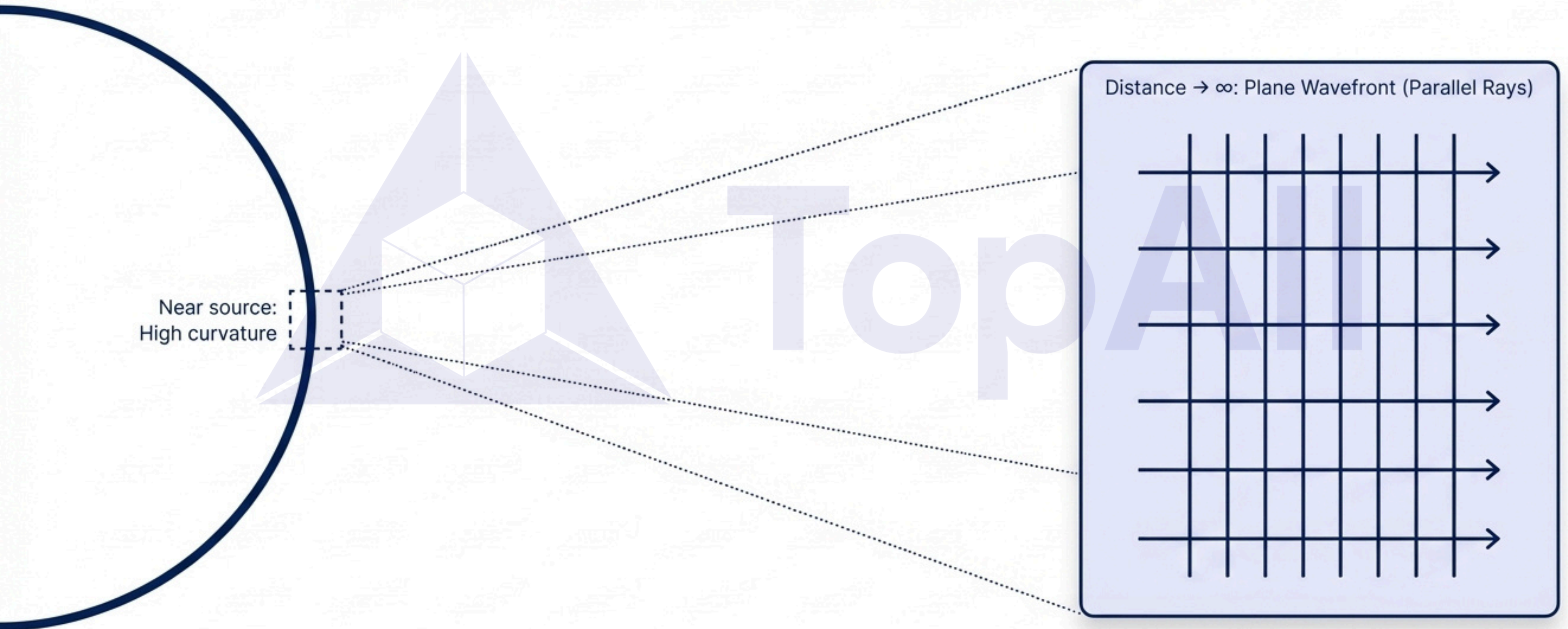


Key Highlights

- » 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 Plane Wave Approximation

At a massive distance from the source, the curvature of the sphere becomes negligible.
A small portion of a distant spherical wave can be treated mathematically as a flat plane.



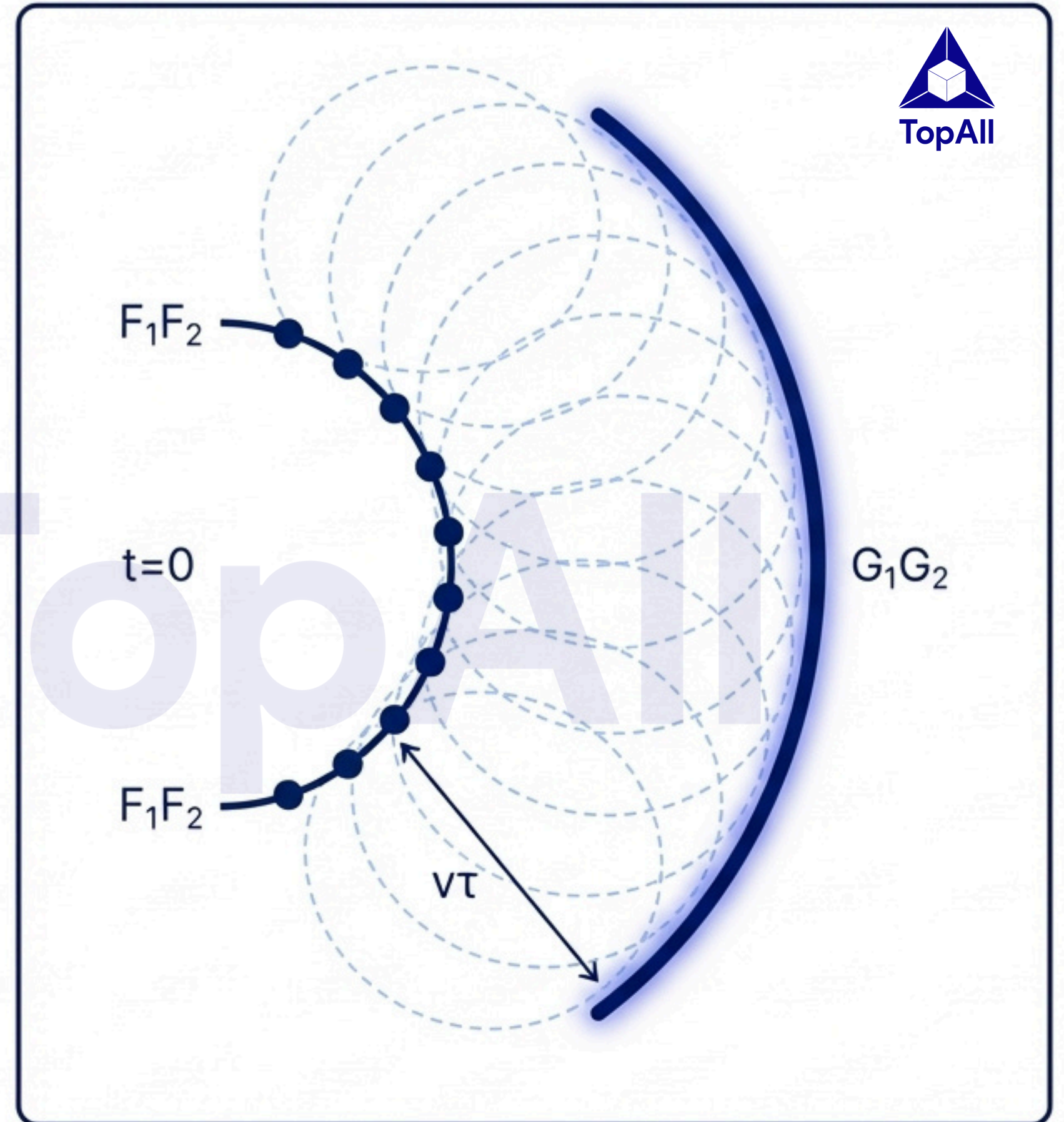
The Geometrical Engine of Light

How does a wave know where to go next?
Huygens provided a geometric rule:

Step 1: Every point on a wavefront acts as a source of secondary wavelets.

Step 2: These wavelets spread out with speed v over time τ , creating spheres of radius $v\tau$.

Step 3: The new wavefront is the forward envelope (common tangent) of these wavelets.



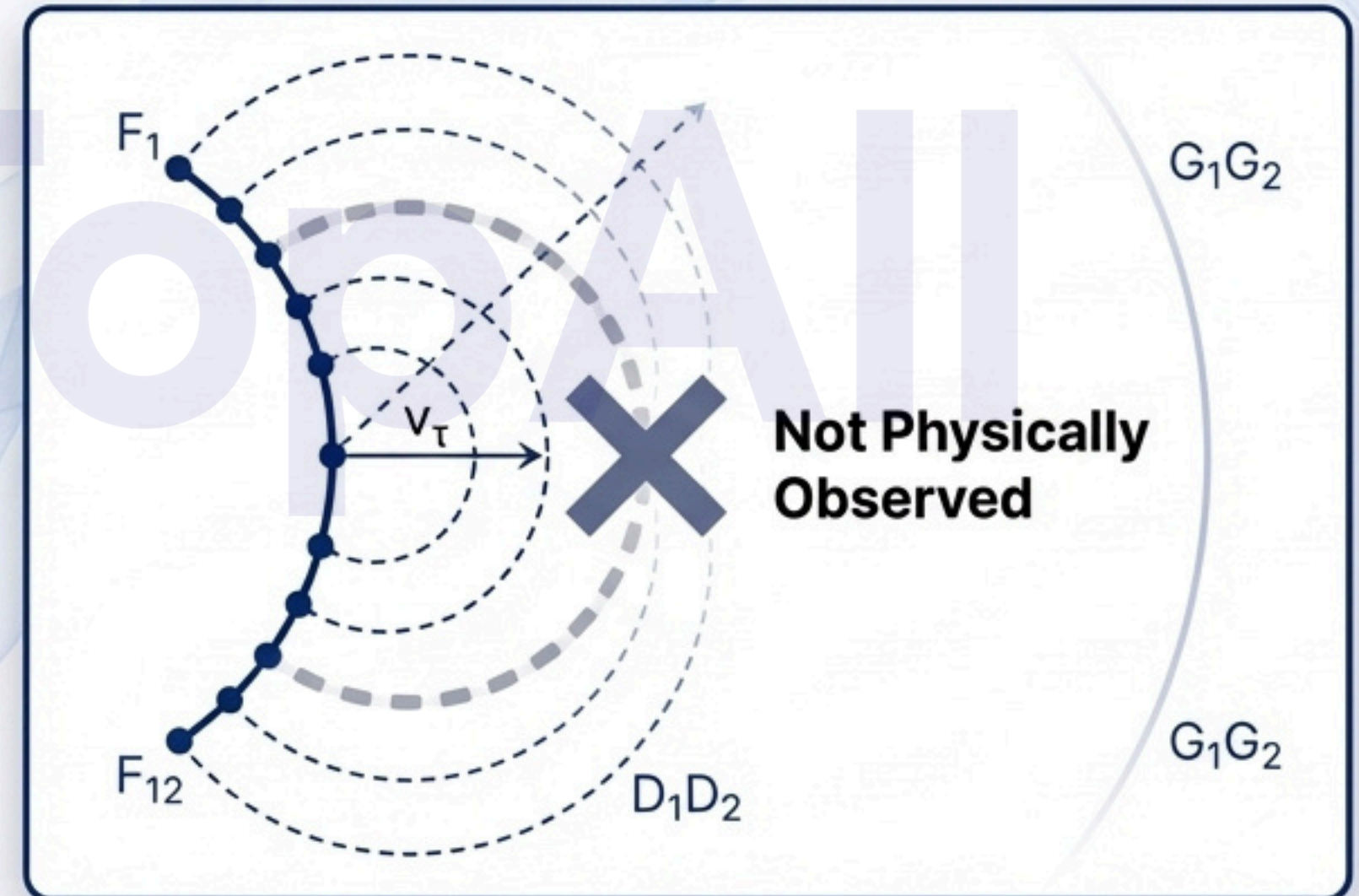
The Backwave Problem

The geometric construction naturally creates an inner backwave (D1D2). However, a backward-moving light wave is never physically observed.

Huygens' Ad-Hoc Assumption

To fix this, Huygens simply assumed that secondary wavelet amplitude is maximum forward and zero backward.

(Later rigorous wave theory mathematically proved why the backwave cancels out).

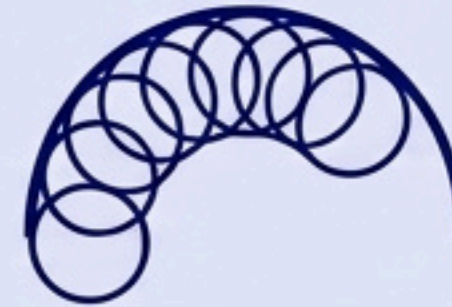


H1: Summary & Foundation



The Wavefront

A surface of constant phase. Energy travels strictly perpendicular to it.



The Mechanism

Every point generates secondary wavelets; their forward tangent envelope creates the next wavefront.



The Tool

It is fundamentally a geometrical construction that accurately predicts wave propagation.



The Foundation

This single principle is the engine that unlocks the laws of reflection, refraction, and diffraction.



You've Learned the Theory.

Now Let's Test It.

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