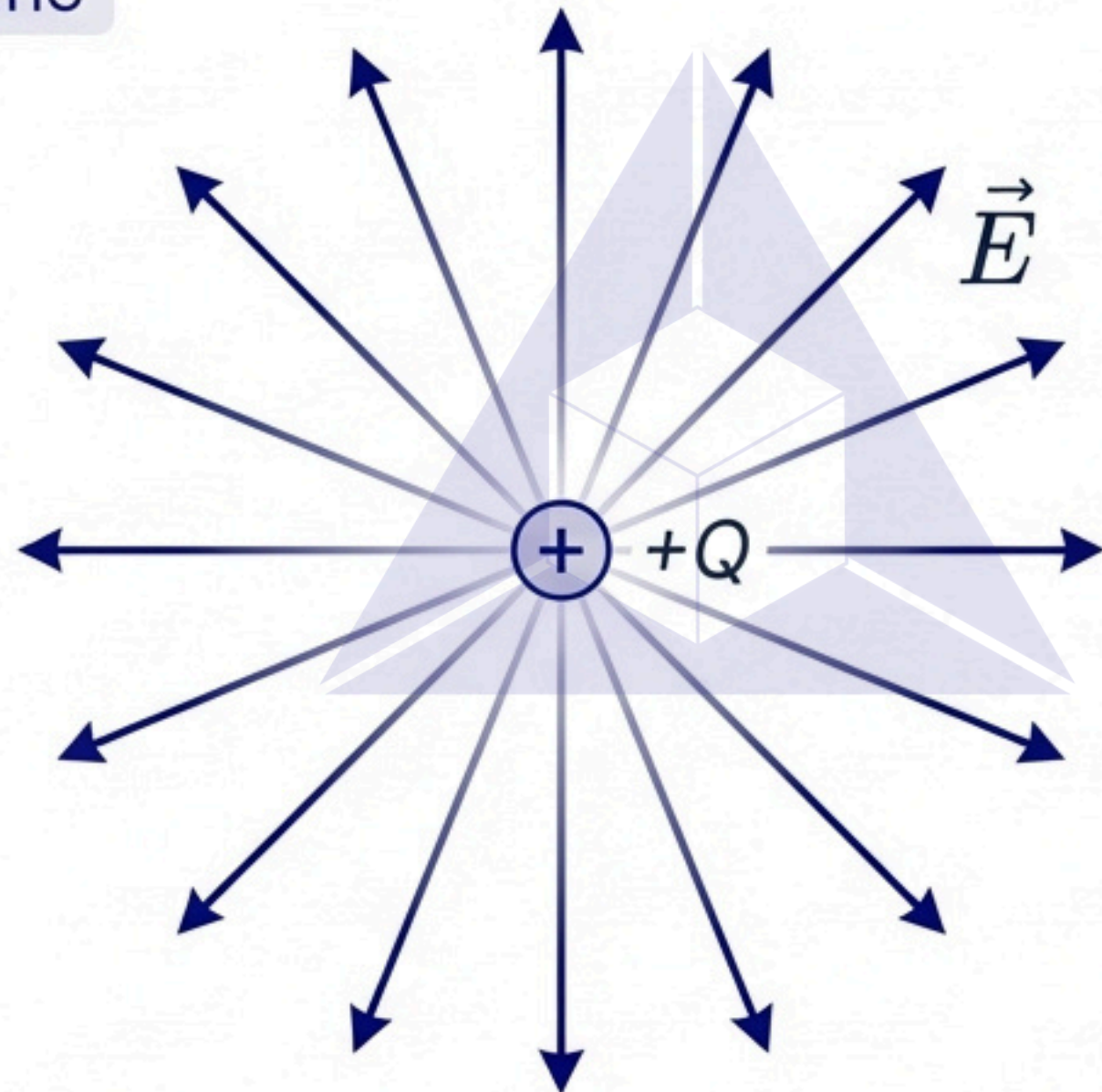


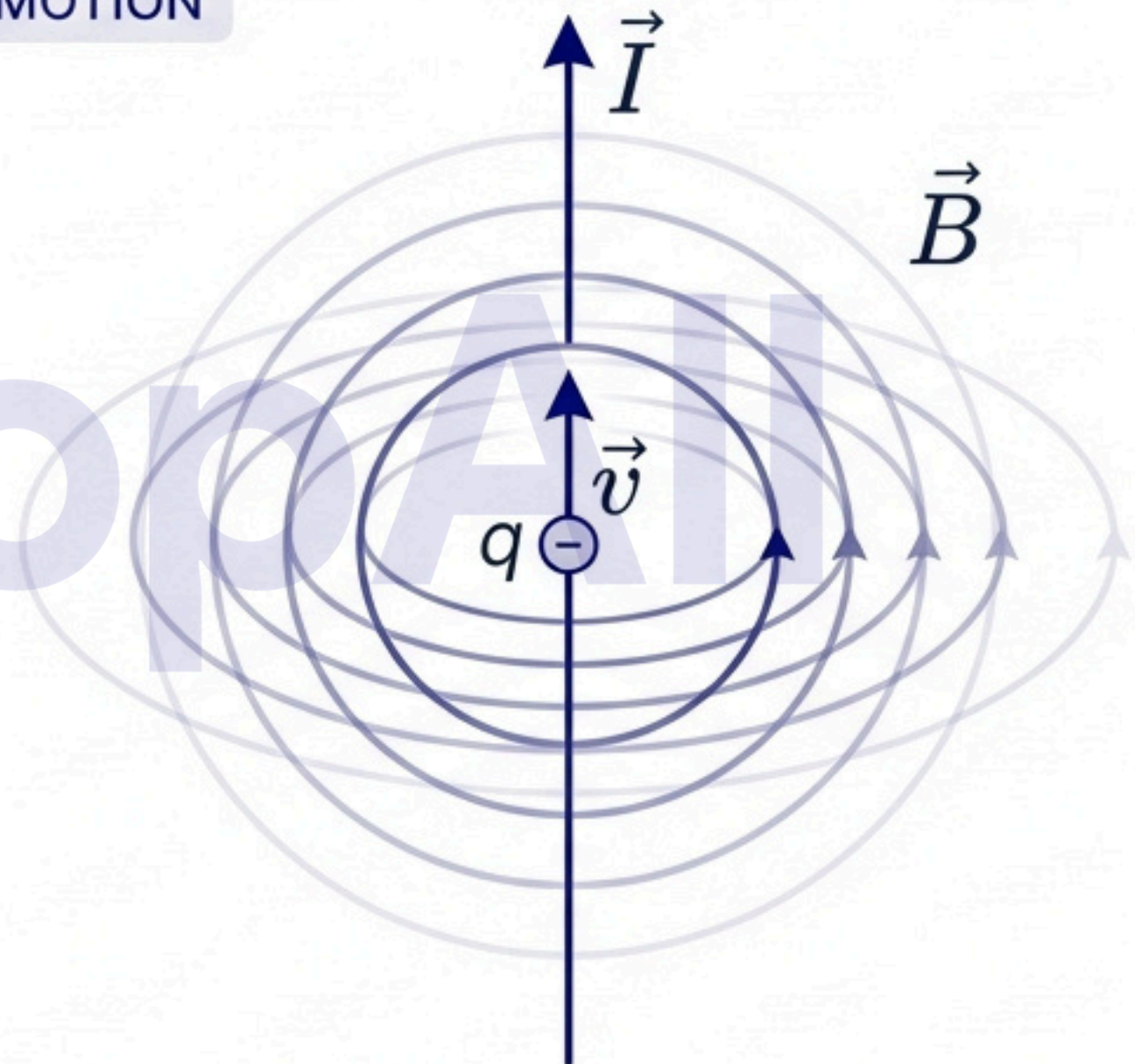
Sources and Fields

Bridging the gap from Electrostatics to Magnetism.

STATIC



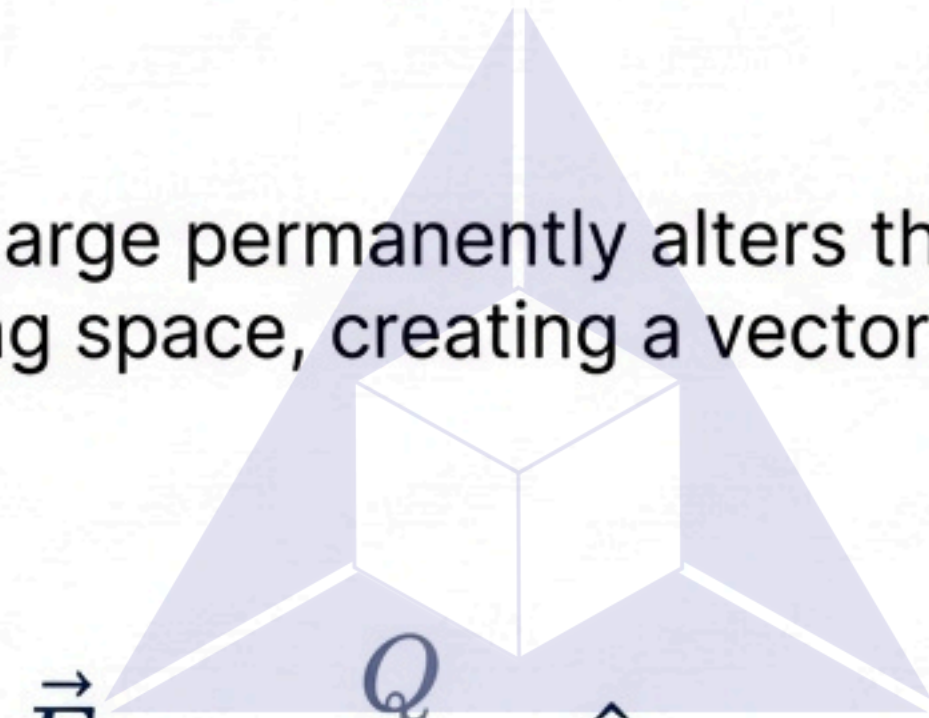
IN MOTION

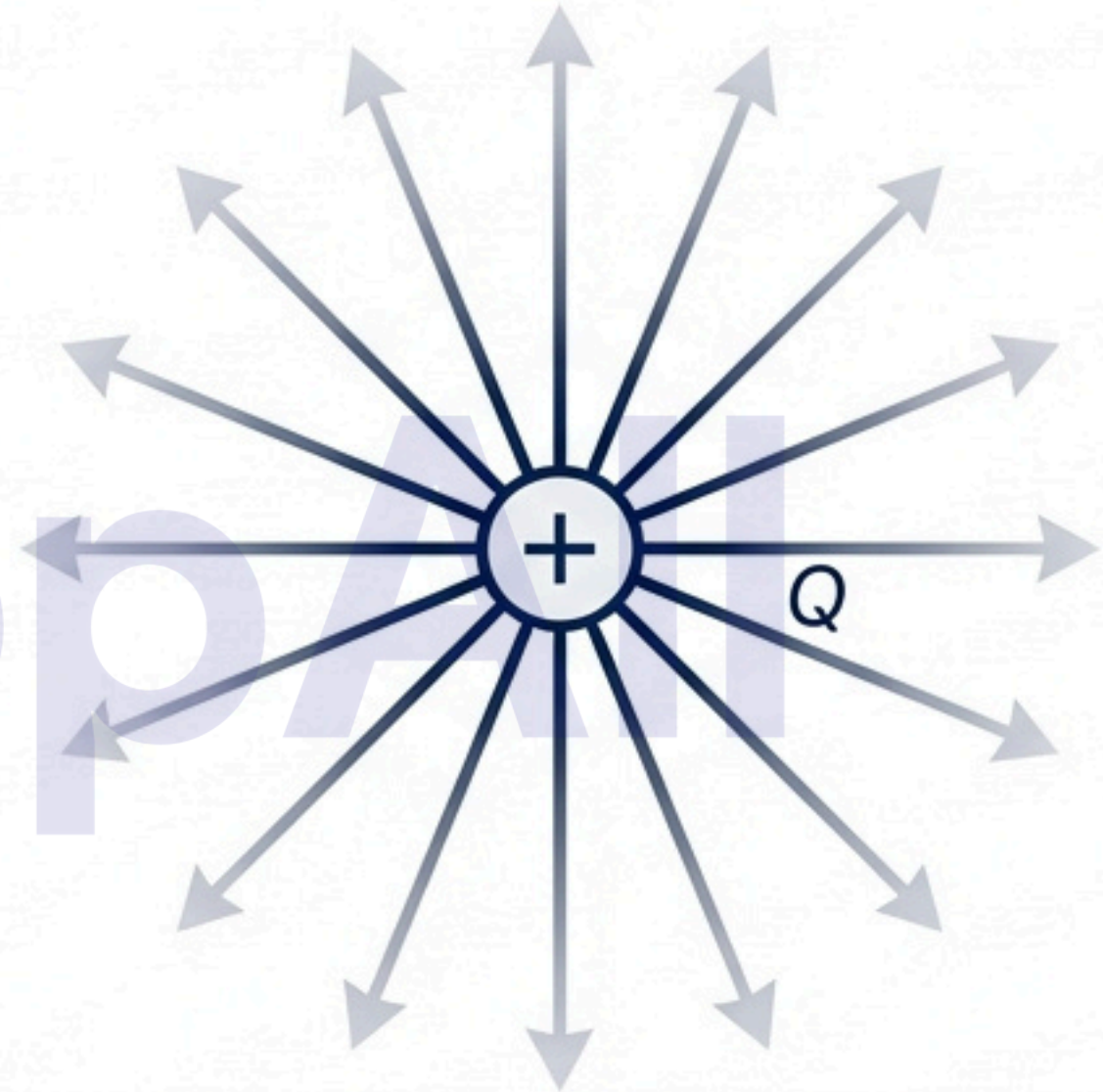


The Static Source: Electric Fields

The Source Charge (Q)

A static charge permanently alters the surrounding space, creating a vector field.


$$\vec{E} = \frac{Q}{4\pi\epsilon_0 r^2} \hat{\mathbf{r}}$$

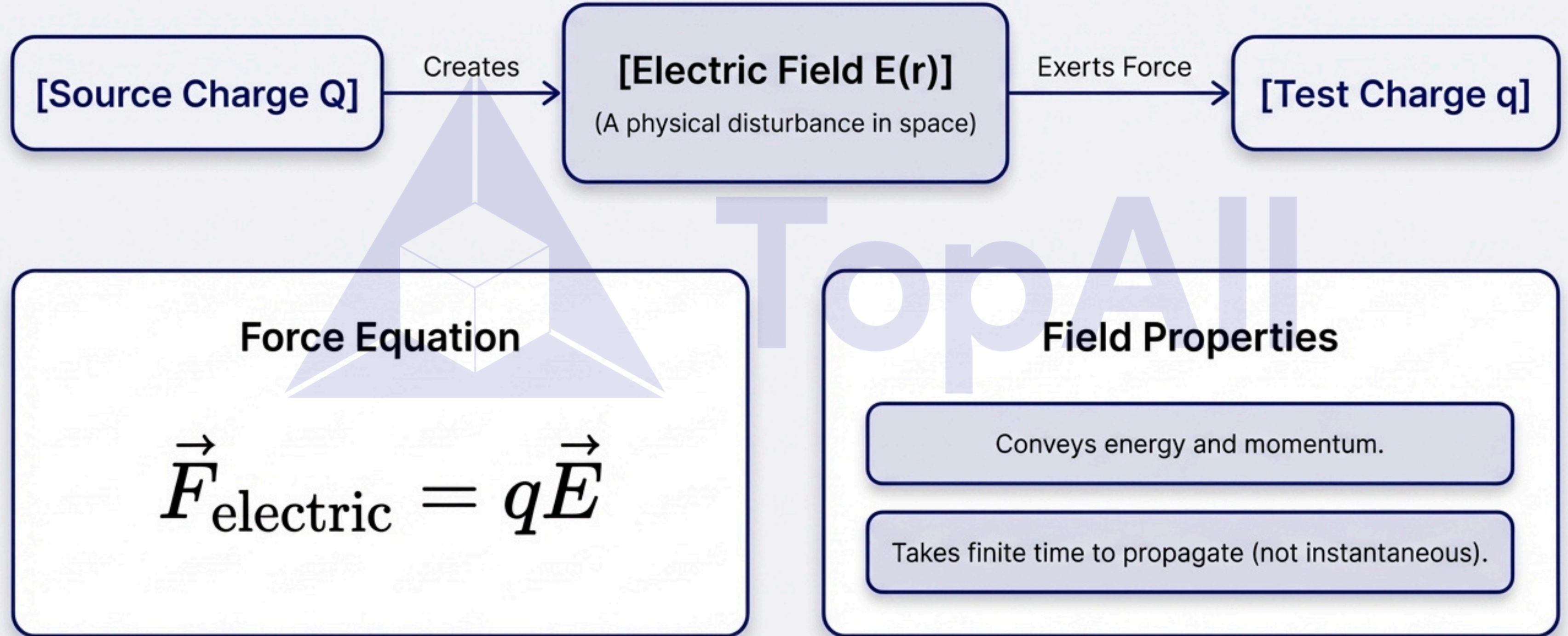


Principle of Superposition

The field at any point is the vector addition of fields from individual sources.

$$\vec{E}_{\text{net}} = \vec{E}_1 + \vec{E}_2 + \dots$$

The Two-Stage Interaction Mechanism





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Let's Test Them Now.**

$$E=mc^2$$



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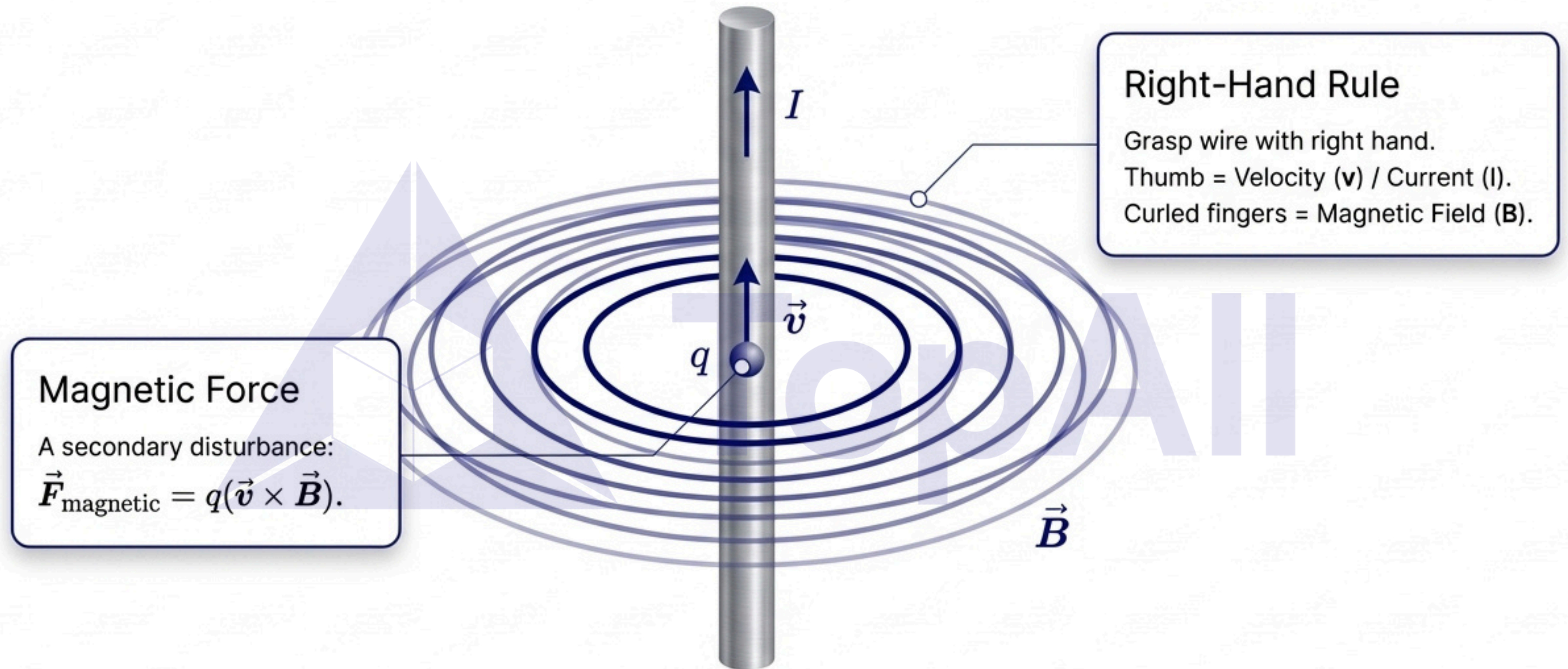
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The Evolving Source: Magnetic Fields



Magnetic Superposition

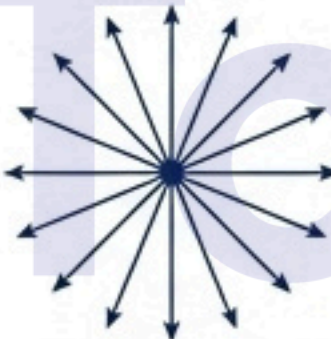
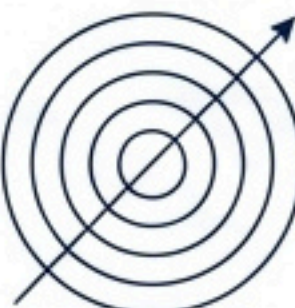
Just like E-fields, B-fields add vectorially:

$$\vec{B}_{\text{net}} = \vec{B}_1 + \vec{B}_2 + \dots$$

Synthesis: The Geometry of Fields



Key Takeaways

	Electric Field ($\vec{E}$)	Magnetic Field ($\vec{B}$)
The Source	Static Charge (Q)	Moving Charge (v) / Current (I)
Field Geometry	Radial (straight lines from source) 	Concentric (circular loops wrapping axis) 
Force Mechanism	$\vec{F} = q\vec{E}$ (parallel/anti-parallel to field)	$\vec{F} = q(\vec{v} \times \vec{B})$ (perpendicular to velocity and field)
Superposition	Yes ($\vec{E}_{\text{net}} = \sum \vec{E}_i$)	Yes ($\vec{B}_{\text{net}} = \sum \vec{B}_i$)

Interaction always occurs in two stages: The source creates the field, and the field exerts the force.



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