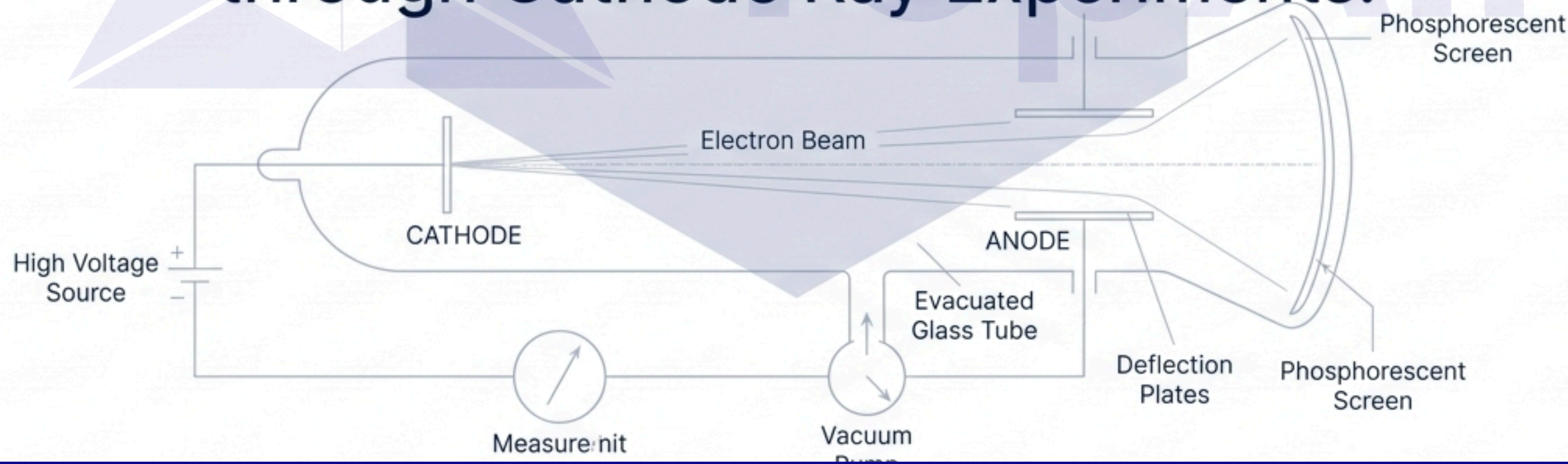
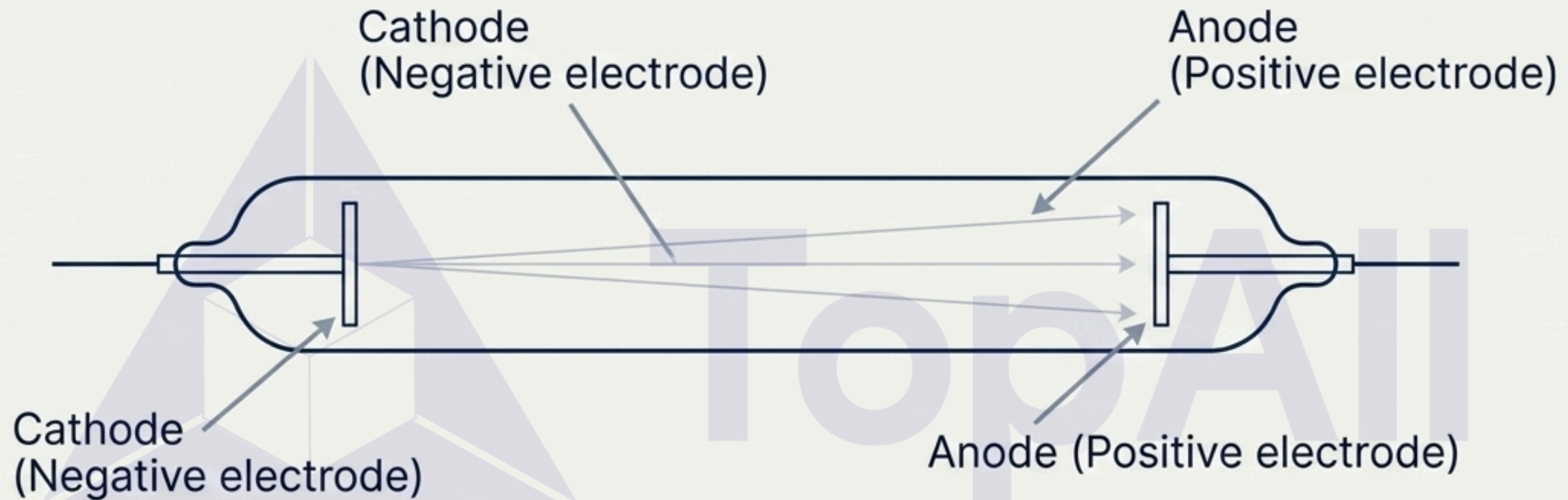


Discovery of Electron

Unveiling the Sub-Atomic World
through Cathode Ray Experiments.



The Cathode Ray Tube (CRT)



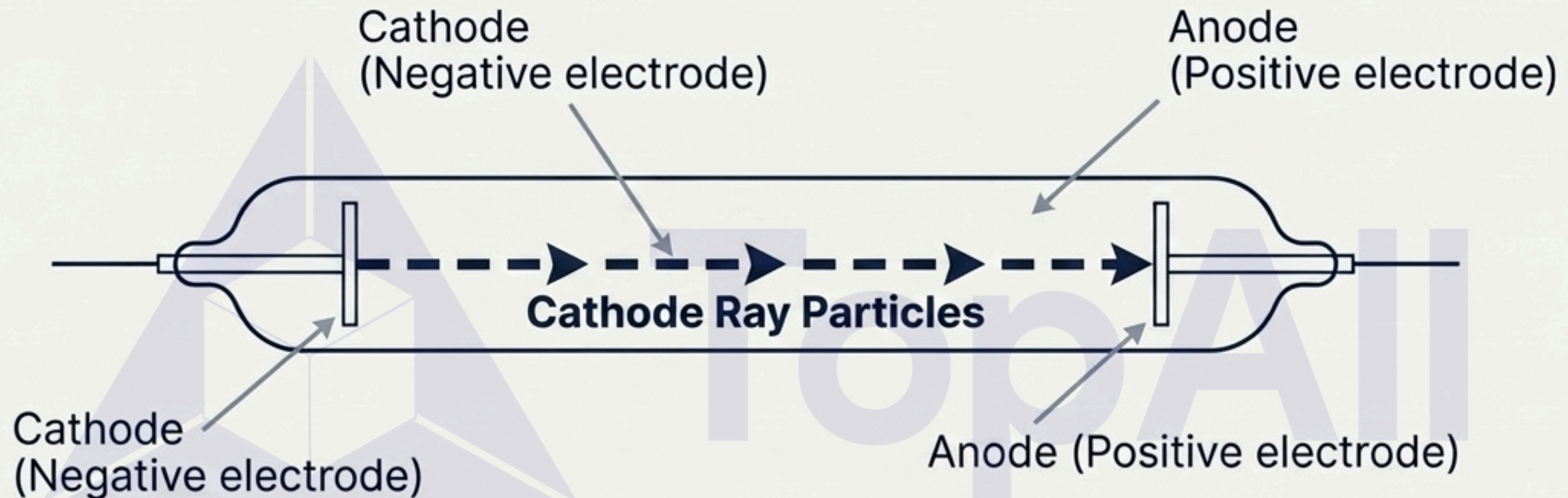
Pressure $\approx$ Very Low

(Evacuation of the glass tube allows unimpeded particle flow)

Voltage = Very High

(Necessary to induce electrical discharge across the gap)

The Flow of Cathode Rays



When sufficiently high voltage is applied across the electrodes, current flows through a stream of particles moving strictly from the negative electrode (Cathode) to the positive electrode (Anode).

Flow: Cathode → Anode



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$$E=mc^2$$



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Detecting the Rays

1. Perforated Anode

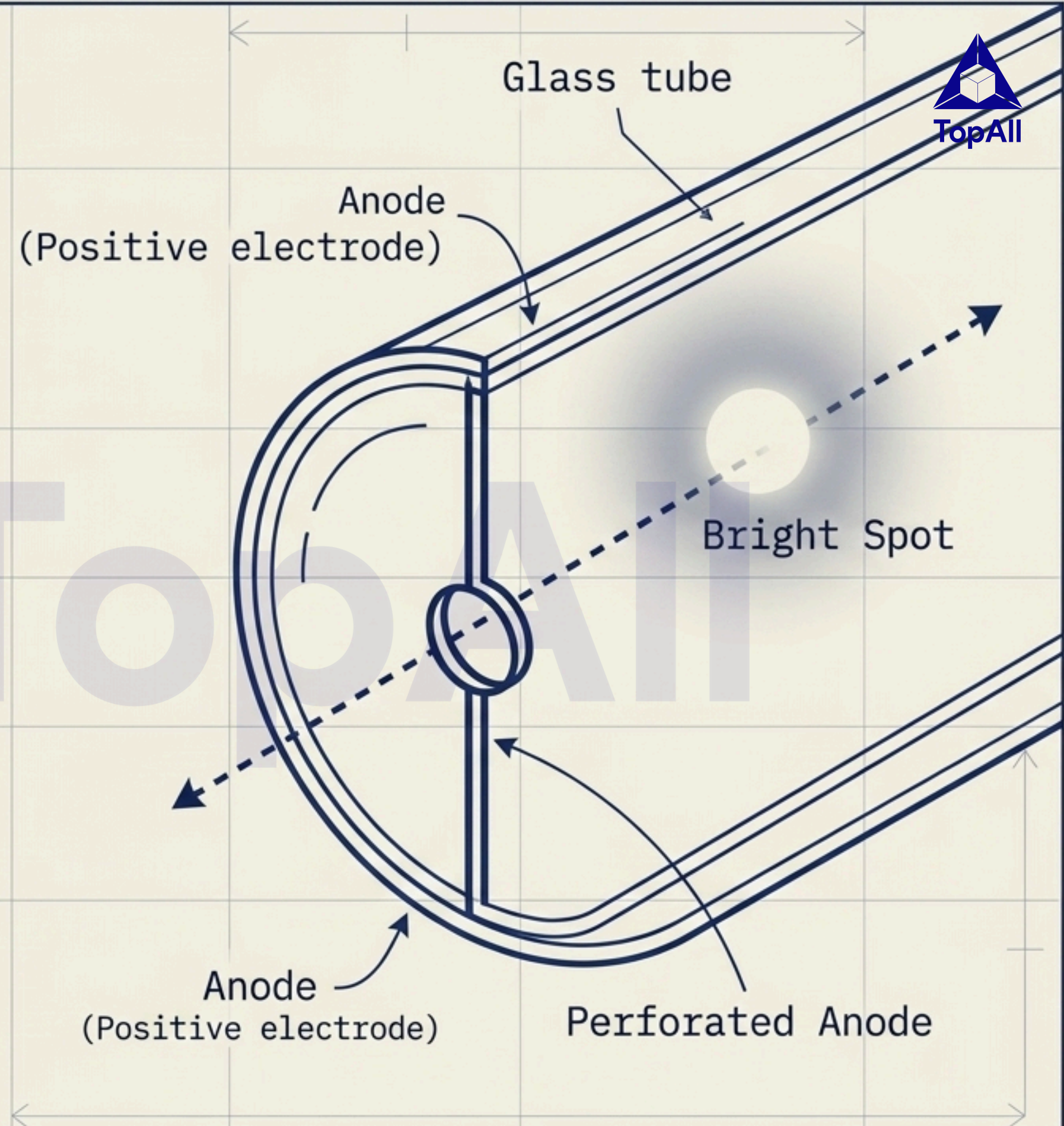
Rays pass directly through a physical hole made in the positive electrode.

2. Phosphorescent Coating

The glass wall behind the anode is coated with Zinc Sulphide (**ZnS**).

3. The Bright Spot

When cathode rays strike the coating, a distinct bright spot develops on the screen.



Experimental Observations



Trajectory

In the absence of electrical or magnetic fields, these rays travel in perfectly straight lines.



Deflection

In the presence of fields, rays deflect towards the positive pole, proving they consist of negatively charged particles.



Independence

Ray characteristics do not depend upon the material of the electrodes or the nature of the gas inside the tube.

CAUTION: A Common Misconception



The Myth

Cathode rays are highly visible glowing beams inside the tube.



The Reality

Cathode rays themselves are entirely invisible.

The bright glow we observe is solely the response of the fluorescent/phosphorescent materials (like **ZnS** or early television screens) when physically hit by these invisible particles.

The Final Verdict



Cathode Rays = Electrons

Premise: They are fundamental, negatively charged particles.

Evidence: Because their physical behavior remains identical regardless of the specific gas or electrode material used in the experiment...

Conclusion: ...we can definitively conclude that electrons are the basic constituents of ALL atoms. (This fundamentally disproves Dalton's theory of indivisible atoms).



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