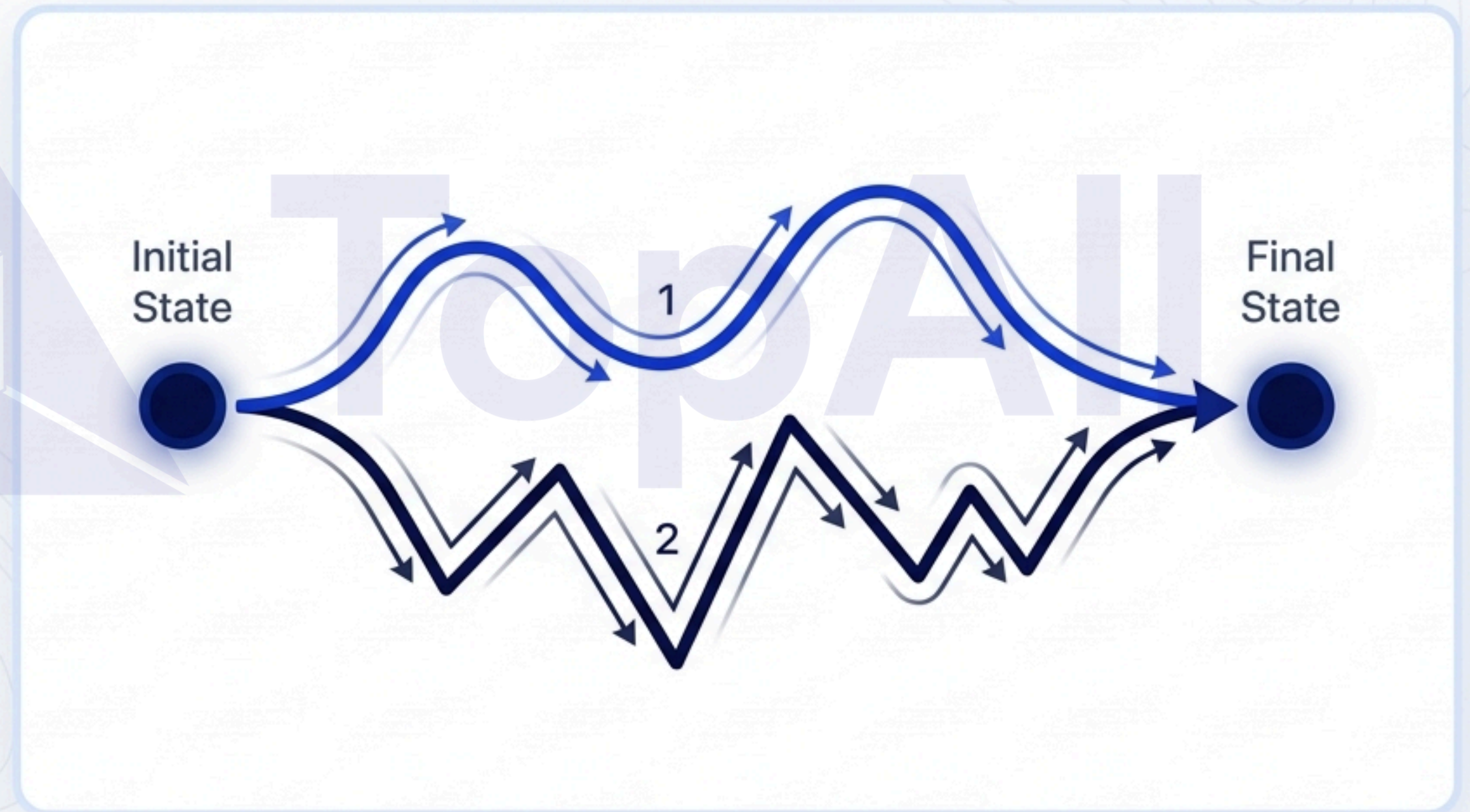


State Variables & State Functions | Thermodynamics



Thermodynamics Cares About the Destination — Not the Route.



HOW DO WE DESCRIBE A STATE?

In thermodynamics, we do not track every individual atom. Instead, we describe the system using its macroscopic (bulk) properties.

 P

Pressure

 V

Volume

 T

Temperature

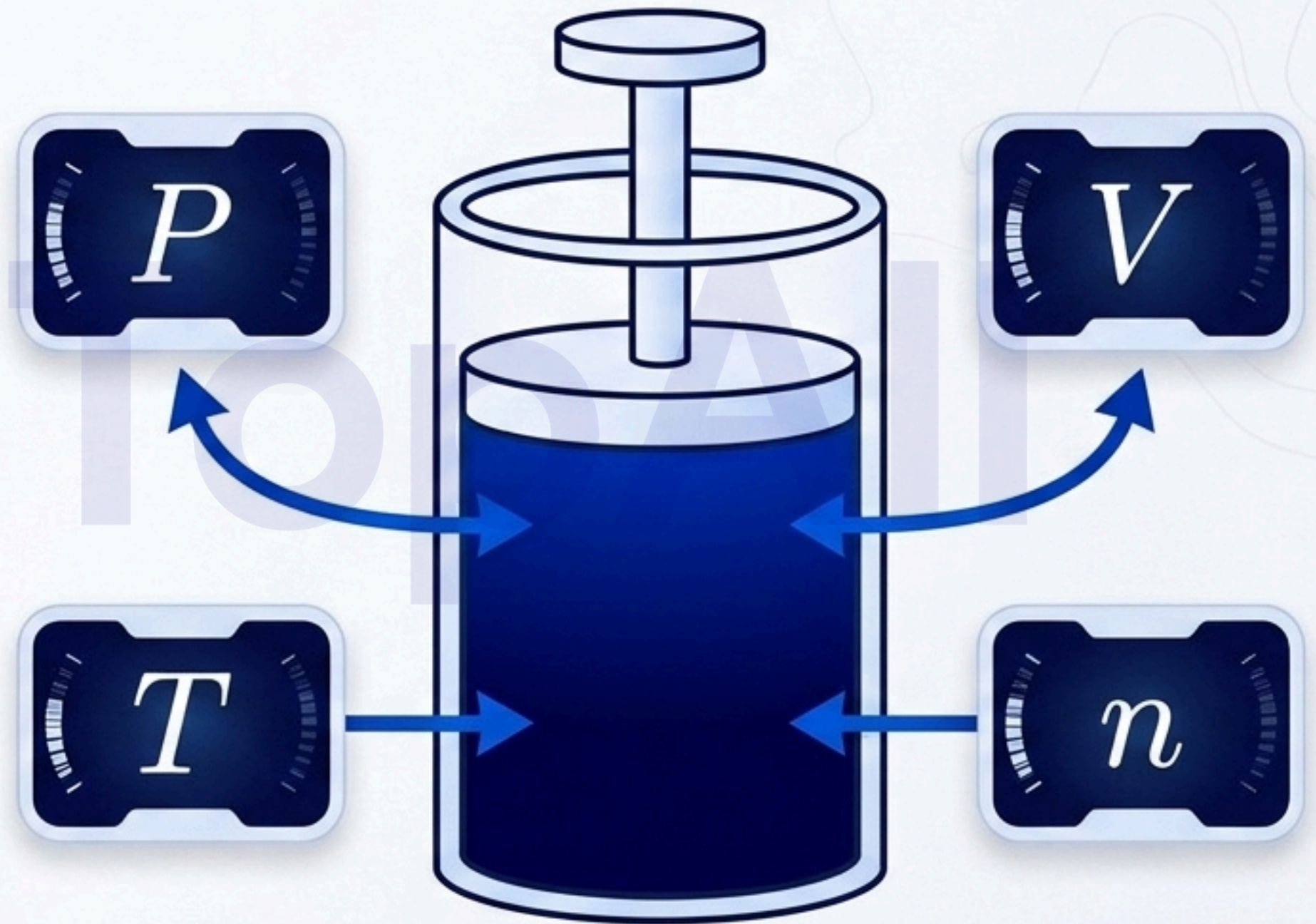
 n

Amount
(moles)

The Macroscopic Piston

A thermodynamic state is completely defined by its macroscopic variables.

Once a minimum number of these properties are fixed, the rest automatically lock into definite values.





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

$$E=mc^2$$



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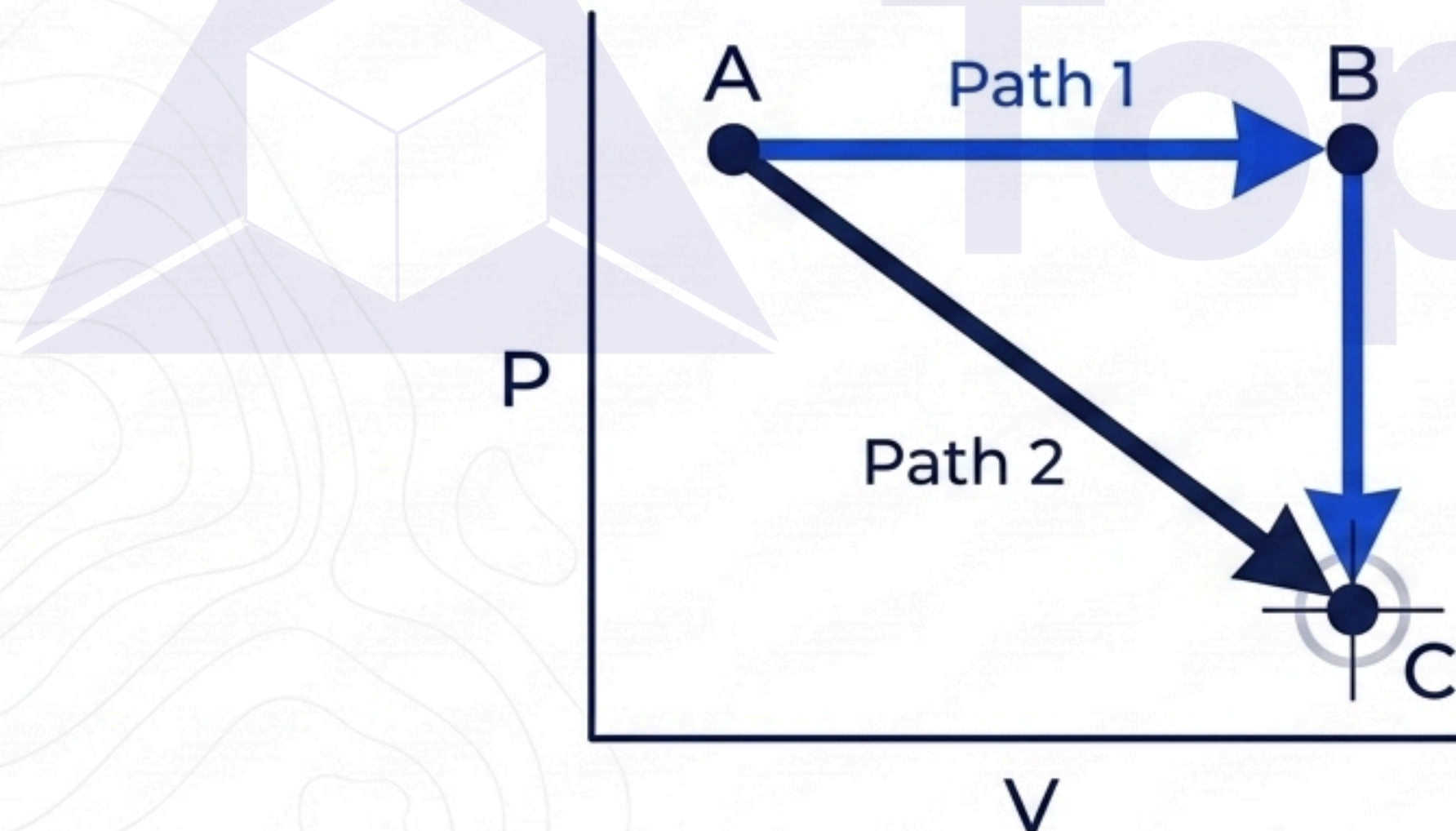
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The Golden Rule of State Functions

State variable value depends on the state, not the path.



JEE Trap Alert: The Path vs. State Confusion

JEE Trap Alert

State Functions

Depend only on the initial and final states.

P, V, T, U, H

Path Functions

Depend on the specific route taken between states.

q, w

Do not treat q and w like state variables. Their values will change if you take a different path, even if the final destination is the same!

Mastery Summary

Key Takeaways

- ✓ **State = macroscopic condition:** It ignores the microscopic history of individual atoms.
- ✓ **The Dashboard:** P , V , T , n are the macroscopic gauges that describe the state.
- ✓ **Endpoint Memory:** State functions only care about the initial and final values.
- ✓ **Path Irrelevance:** The route taken is mathematically irrelevant to the total change in a state function.



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