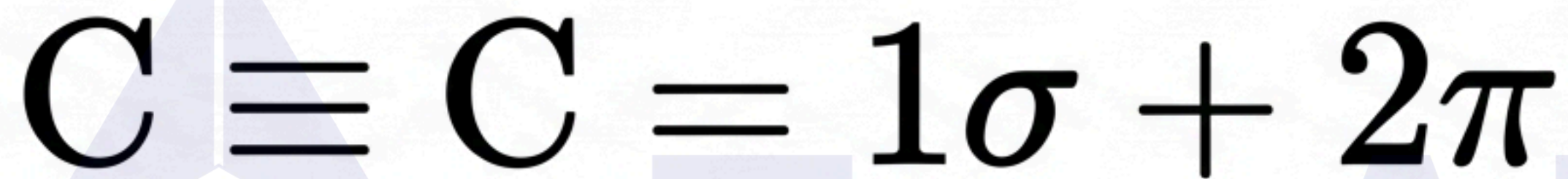


Structure of C $\equiv$ C Triple Bond



THREE BONDS — BUT ONLY ONE SIGMA.



Bond Length: **120 pm**
(Shortest C-C bond)

Bond Enthalpy: **823 kJ/mol**
(Strongest C-C bond)



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

$$E=mc^2$$



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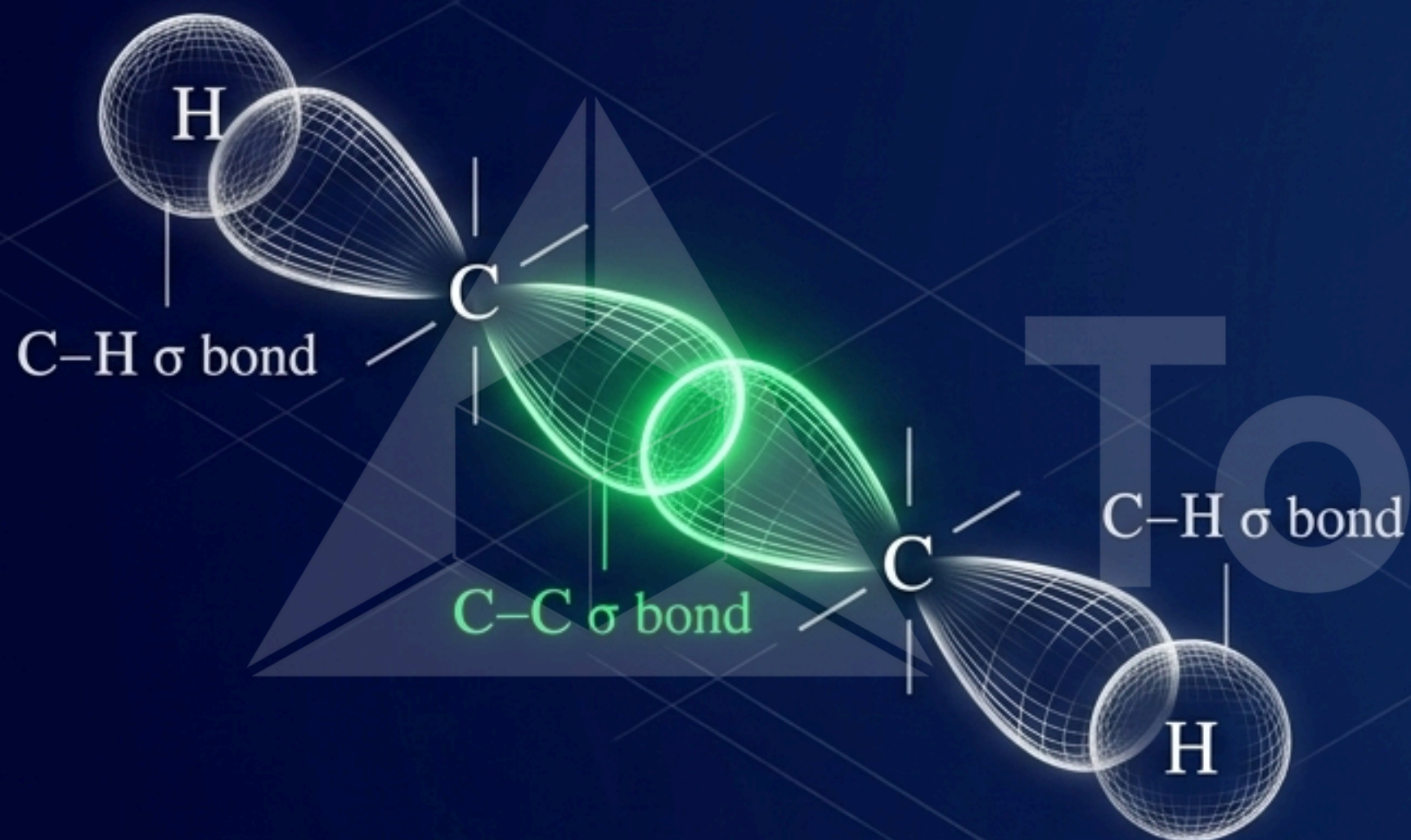
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Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
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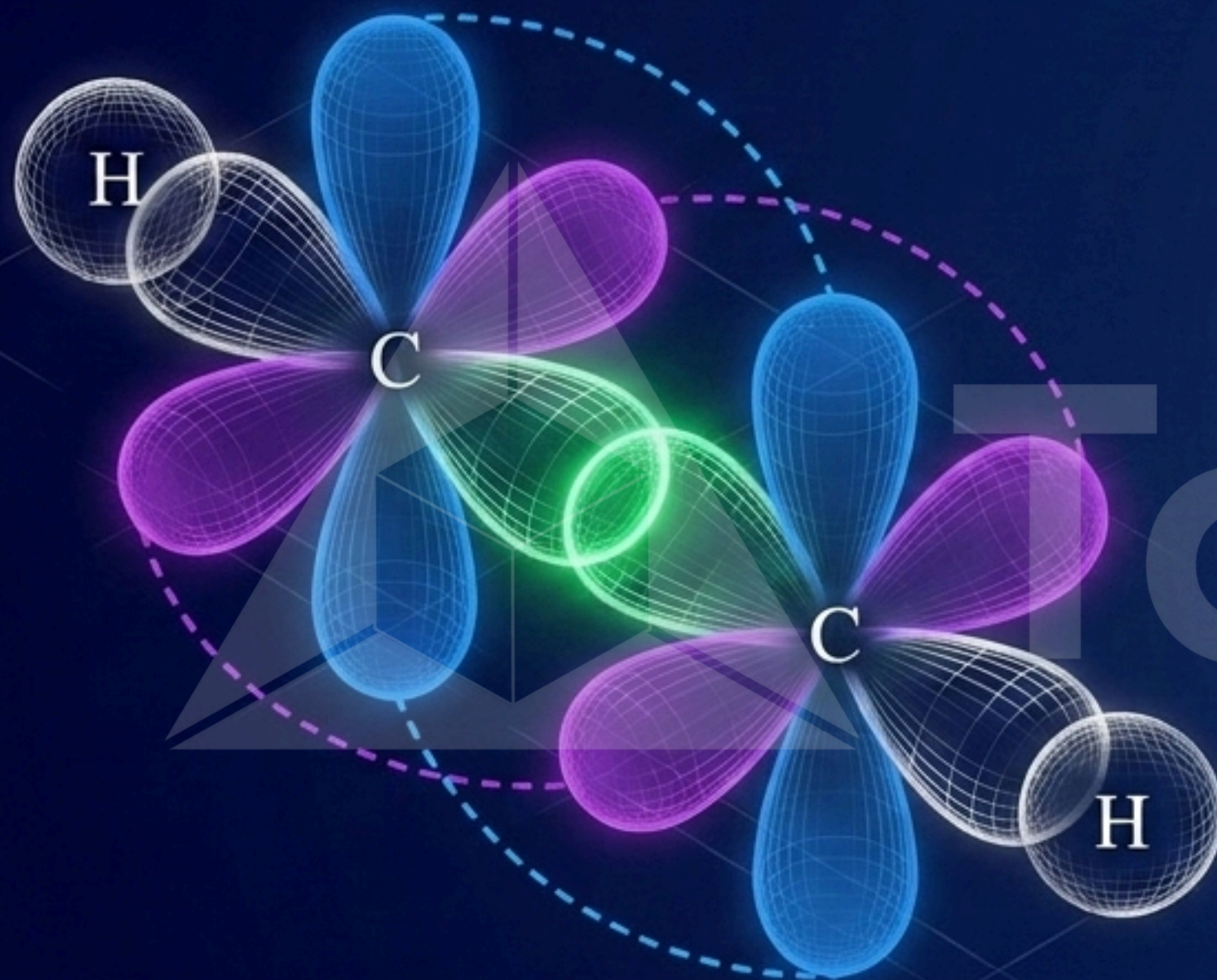
The Sigma Foundation: sp Hybridisation



Each carbon undergoes sp hybridisation.

- 2 linear sp orbitals per carbon.
- Head-on overlap forms the primary $\text{C}-\text{C}$ σ bond.
- Remaining sp orbitals overlap with Hydrogen $1s$.

The Pi Scaffolding: Orthogonal Overlap



Two mutually perpendicular lateral-overlap planes.

Unhybridized 2p orbitals overlap sideways.

Creates an electron cloud that is **cylindrically symmetrical** around the internuclear axis.

The Final Architecture: Molecular Geometry



Because of the sp sigma foundation and symmetric pi-cloud tension, Ethyne is a **perfectly linear** molecule.

TRAP

Assuming $C \equiv C$ means “three identical bonds.”



TRUTH

The bonds are energetically and spatially completely different ($1\sigma \neq \pi$).

Revision Matrix

σ Bond	Head-on overlap	sp - sp hybridised	Stronger	Located on the internuclear axis
Two π Bonds	Lateral overlap	$2p$ - $2p$ unhybridised	Weaker	Located above/below/sides of axis

$1\sigma + 2\pi$ = Maximum electron density, resulting in the shortest (120 pm) and strongest (823 kJ/mol) carbon-carbon bond.



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