Record-Cold Rubidium Bose-Einstein Condensate

Prelims: *Current events on National and International Importance| Science & Technology*

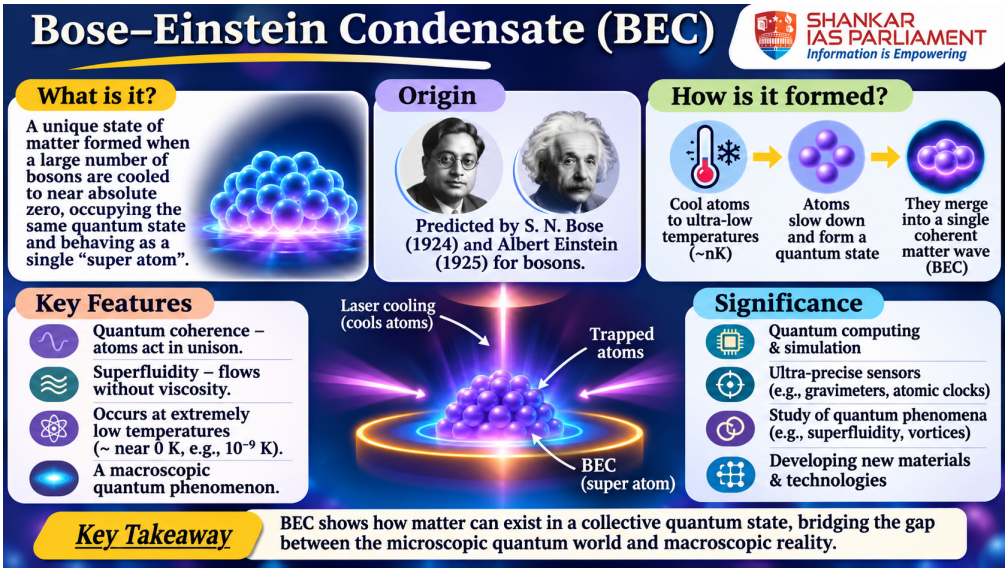
Why in News?

Chinese researchers created a record-cold Bose-Einstein condensate (BEC) at 9.7 picokelvins (9.7 trillionths of a kelvin above absolute zero) aboard the Tiangong space station's Mengtian laboratory module.

- **Temperature–** 9.7 picokelvins (roughly 280 billion times colder than deep space), beating the previous 2021 drop-tower record of 38 picokelvins by about four times.
- **Atoms Used –** Around 20,000 **Rubidium-87** atoms.
- **Trapping Method–** An optical dipole trap system inside the **Cold Atom Physics Rack (CAPR)** rather than standard magnetic traps.
- **Observation Time–** The ultracold atomic cloud expanded freely and remained trackable for **seven seconds** in microgravity, up from just two seconds in previous drop tests or one second on the International Space Station.
- **Team & Publication–** Led by physicists Xiaoji Zhou and Xuzong Chen (Peking University) and Weibiao Chen (Chinese Academy of Sciences), with findings published in **Science**.

Why Microgravity Matters?

- **No Gravitational Sag–** On Earth, gravity pulls atoms down and forces researchers to squeeze them tightly against magnetic or optical fields, which heats them up.
- **Longer Measurements–** Weightlessness lets the quantum gas expand slowly and gently without dropping out of reach, opening doors for quantum simulations, ultra-precise space sensors, and tests of general relativity.



Reference

[Physics World| Record-Cold Rubidium Bose-Einstein Condensate]

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