Forgotten Particle May Explain Why the Universe Exists

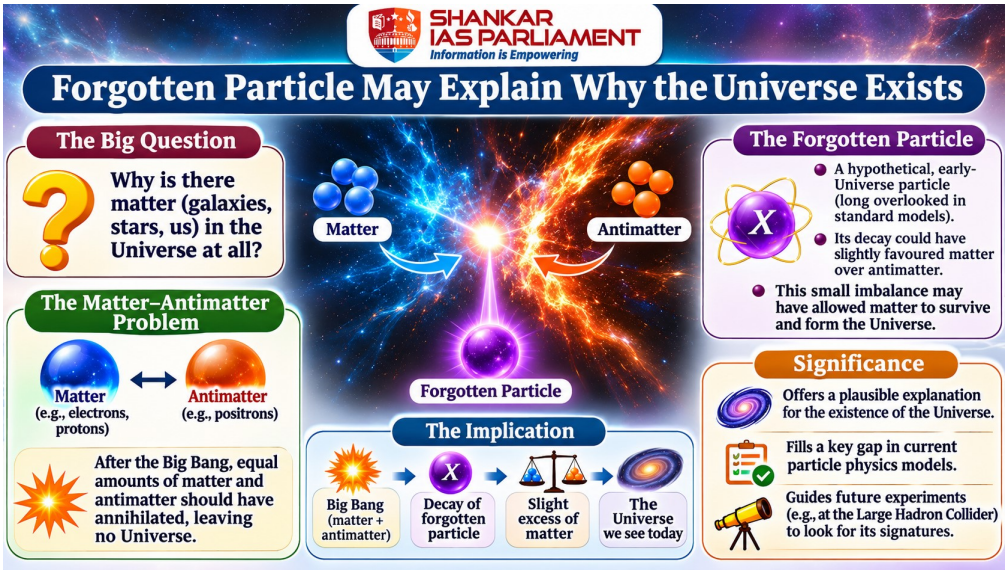
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Why in News?

Physicists Rishav Roshan (University of Southampton) and Sudipta Show (IIT Kanpur) proposed in a Physical Review Letters study that a slow-decaying, "decoupled" heavy right-handed (sterile) neutrino may explain why matter survived the Big Bang.

How the Theory Works?

- **Why it was overlooked–** This third heavy neutrino partner interacts very weakly with other particles, leading many physicists to treat it as a minor background detail.
- **Temporary dominance–** Because it decays very slowly, the particle could have lived long enough to briefly dominate the early universe's energy density as the cosmos cooled.
- **Matter over antimatter–** That dominance would have altered how fast space expanded and shifted the temperature at which particles interacted via the Higgs boson, helping create the matter-antimatter imbalance that allowed stars, planets, and life to form.
- **Current Status & Testing**
- The particle and early dominance era remain theoretical predictions rather than direct observations.
- Researchers suggest the model could be tested indirectly through primordial gravitational wave signatures (such as from cosmic strings) using future observatories like **LISA** and the **Square Kilometre Array Observatory (SKAO)**.



Reference

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