New Method to Shape Quantum Magnetism

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

Why in News?

Researchers at the Raman Research Institute (RRI) in Bengaluru announced a theoretical method to control quantum magnetism by altering network connectivity rather than relying solely on direct spin-spin interactions.

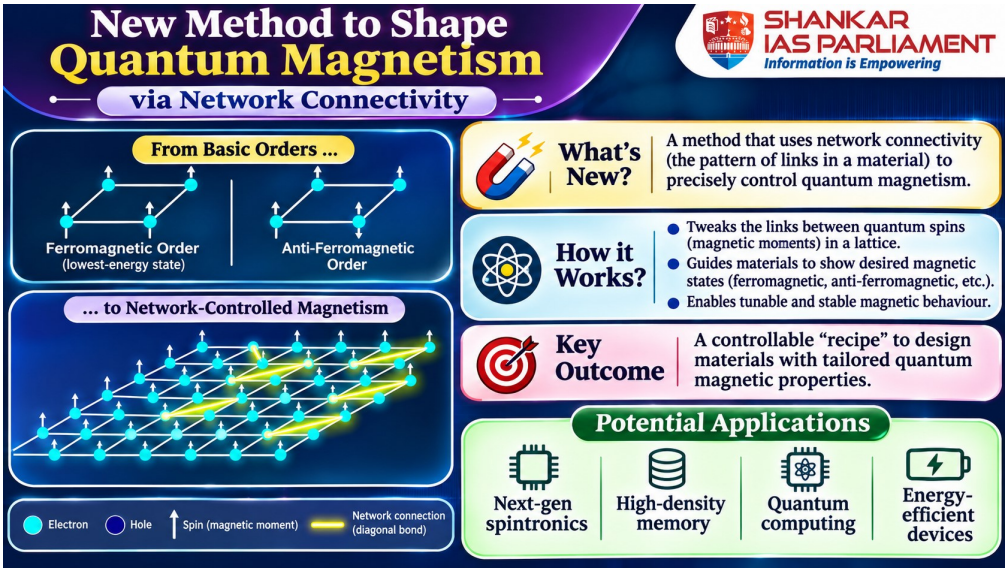
How the RRI Method Works?

- **Altering connections–** Adding a diagonal bond to a square lattice changes how sites connect and shifts the system's collective magnetic order.
- **Entangled singlet states–** That extra link pushes two electron spins into an antiparallel **singlet state** (total spin zero), keeping them quantum-entangled.
- **Computational scale–** Analyzing a 20-site lattice required evaluating more than 2,000,000 distinct configurations.
- **Current status–** The work is theoretical, with experimental demonstrations still pending.

Other Recent Magnetisation Breakthroughs

Several other research teams also reported advances in magnetic control for computing and quantum memory in late 2026:

- **Single-atom nuclear spin (TU Delft)–** Researchers used radio waves and adapted double magnetic resonance to control magnetism inside a single atom's nucleus, which is less prone to environmental noise.
- **Magnon handedness (Ames National Laboratory)–** Scientists switched the handedness of spin waves (magnons) in ferrimagnets using an external magnetic field.
- **Ultrafast laser switching (UC San Diego)–** Engineers used a structured ultrafast laser beam to switch magnetic states without an external magnetic field.



Reference

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