DEMON PARTICLE

Context

- A team of researchers from the University of Illinois has identified a rare particle known as a "demon particle" within the metal strontium ruthenate.

Importance of this Demon particle

- This discovery has the potential to pave the way for the development of superconductors capable of operating at room temperature.

Demon particle was predicted by

- Theoretical physicist David Pines in 1956

Applications

- many applications in **computing, medical imaging, transportation, and energy.**

What is a Demon particle?

- It is a type of quasiparticle, which is not a real particle, but rather a collective excitation or vibration of many electrons in a solid.
- Quasiparticles can help explain the complicated behavior of electrons in solids like metals and semiconductors.

The Science Behind Demon Particle

1. However, with such a massive mass, plasmons (collective oscillation of conduction electrons in metals) cannot occur at ambient temperature with the energies available.
2. Demons, on the other hand, do not have mass; they can develop with any energy and at any temperature.

SUPERCONDUCTORS

About

- A superconductor is a material that can conduct electricity or transport electrons from one atom to another with no resistance.

How a material becomes Superconductive

- No heat, sound, or any other form of energy would be released from the material when it has reached critical temperature (Tc), or the temperature at which the material becomes superconductive.

Examples of Superconductor materials

- Aluminium,
- niobium,
- magnesium diboride

Applications

- Superconductors are employed in high-precision magnetic resonance imaging (MRI) machines and levitating trains.

Limitations of Superconductors

- Their utility is still limited by the requirement for substantial cryogenics (the manufacture and behavior of materials at extremely low temperatures), as common superconductors work at atmospheric pressures but only if kept extremely cold.
- Even the most sophisticated ones, such as copper oxide-based ceramic materials, operate only at temperatures below 140°C.