Physicists discover new uranium isotope

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In news– In pursuit of a 'magic number', physicists have recently discovered a new uranium isotope.

About new uranium isotope-

- While studying the atoms of heavy elements, physicists in Japan discovered a previously **unknown isotope of uranium, with atomic number 92 and mass number 241, i.e. uranium-241.**
- **There is particular interest in 'magic number' nuclei:** containing a number of protons or neutrons such that the resulting nucleus is highly stable.
- There is particular interest in 'magic number' nuclei: containing a number of protons or neutrons such that the resulting nucleus is highly stable.
- **The heaviest known 'magic' nucleus is lead (82 protons).** Physicists have been trying to find the next such element.
- The **researchers accelerated uranium-238 nuclei into plutonium-198 nuclei at the KEK Isotope Separation System (KISS).** In a process called multinucleon transfer, the two isotopes exchanged protons and neutrons.
- The resulting nuclear fragments contained different isotopes. This is how the researchers identified uranium-241 and measured the mass of its nucleus.
- The team used time-of-flight mass spectrometry to estimate the mass of each nucleus depending on the time it took to reach a detector.

Significance of new isotope matter-

- The arrangement of protons and neutrons in an atomic

nucleus follows some rules. We know what these rules are based on the nuclei’s properties and structure.

- In general, an atom’s mass is slightly lower than the sum of the masses of protons, neutrons, and electrons.
- So systematically measuring the mass of uranium and its neighbourhood elements yields essential nuclear information to understand the synthesis of such heavy elements in explosive astronomical events.
- The discovery of a new neutron-rich uranium isotope is the **first since 1979.**
- The finding refines our understanding of nuclear physics. What shapes the large nuclei of heavy elements take and how often (or rarely) defines the boundaries of models that physicists use to design nuclear power plants and models of exploding stars.