PRAXIS, NASA Mission to Graze Planet Rings

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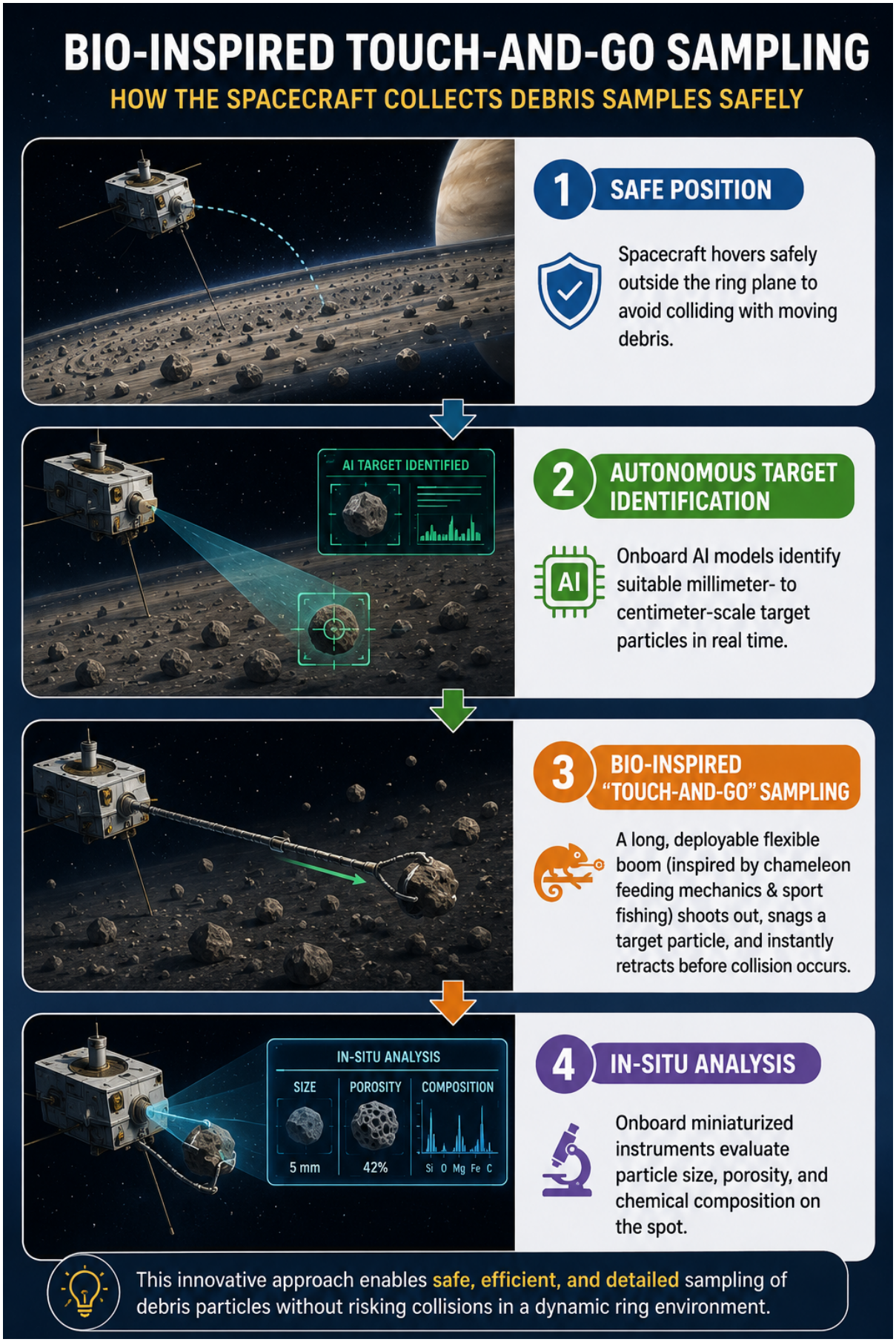
Why in News?

NASA has selected a novel mission concept called PRAXIS (Planetary Rings Autonomous EXploration with In-situ Sampling) for its NIAC 2026 Phase I funding.

- **Aim -** To directly **touch, collect, and analyse physical samples from ring particles** ranging from millimeter to centimetre scale) orbiting ringed planets like ***Saturn, Uranus, and Neptune.***
- It is for the first time in space exploration history.
- **Barrier of Direct Penetration -** Planetary rings consist of millions of fast-moving particles ranging from microscopic dust to house-sized boulders made largely of water ice mixed with rocky material.
- Flying a spacecraft directly through the dense ring plane creates severe collision hazards that could instantly destroy the probe.
- **Unresolved Science Post-Cassini -** While the historic Cassini mission provided groundbreaking close-range photography, it could not directly capture or analyze real particles in-situ.
- Thus, PRAXIS bridges this gap.



- **Technology -** Rather than penetrating the hazardous ring structure, PRAXIS relies on autonomous robotics and AI to "graze" the ring plane.
- **NIAC Progression -** Phase I selection allows the development team to

run computer simulations and refine system designs.
- Advancing to Phase II will allow the creation of physical prototypes.
- **Multi-Target Versatility -** The sampling system is designed to explore dense ring systems (Saturn) and faint/tenuous rings (Uranus and Neptune), as well as ringed Centaurs like Chariklo and Chiron.

Reference

The Hindu | PRAXIS: a NASA mission