New approach widens ground-based detection of solar particle events

Topics: Space Science · UPSC Prelims · TNPSC · SSC · Current Affairs



News

Researchers of the Indian Institute of Geomagnetism (IIG), Mumbai, have shown a new way to detect Solar Particle Events (SPEs) from the ground. Using gamma-ray detectors at India's Arctic and Antarctic research stations, they recorded GLE 77 of 11 November 2025; the study appeared in The Astrophysical Journal Letters. The approach can extend ground-based monitoring beyond the network of neutron monitors.

Background

- Solar energetic particles (mostly protons) are thrown out by solar flares and Coronal Mass Ejections (CMEs). When they are energetic enough to be recorded at ground level, the event is called a Ground Level Enhancement (GLE); GLE 77 occurred on 11 November 2025.
- Such events endanger satellites, astronauts, polar flights and high-frequency radio. Neutron monitors, mostly at high latitudes, are the standard ground detectors.
- India's Aditya-L1 (launched 2 September 2023) studies the Sun from the Lagrange point L1.

Tamil Nadu link: The Kodaikanal Solar Observatory (1899) is one of India's oldest solar observatories, and the GRAPES-3 muon telescope at Ooty (TIFR) studies cosmic rays and solar activity.

Frequently asked questions

What is this news about?

Researchers of the Indian Institute of Geomagnetism (IIG), Mumbai, have shown a new way to detect Solar Particle Events (SPEs) from the ground. Using gamma-ray detectors at India's Arctic and Antarctic research stations, they recorded GLE 77 of 11 November 2025; the study appeared in The Astrophysical Journal Letters.

What is the background to this news?

Solar energetic particles (mostly protons) are thrown out by solar flares and Coronal Mass Ejections (CMEs). When they are energetic enough to be recorded at ground level, the event is called a Ground Level Enhancement (GLE); GLE 77 occurred on 11 November 2025.

Practice questions (with answers)

1. The new approach to detecting solar particle events will widen what?

A) Ground-based monitoring coverage

B) Monsoon forecasting

C) Earthquake detection

D) Satellite launch windows

Answer: A – Explanation: It extends ground-based monitoring beyond the neutron monitor network.

2. Which ground instruments conventionally detect Ground Level Enhancements (GLEs)?

A) Rain gauges

B) Neutron monitors

C) Seismographs

D) Anemometers

Answer: B – Explanation: Neutron monitors record secondary neutrons produced when solar particles hit the atmosphere.

3. Where is India's Aditya-L1 spacecraft placed?

A) Lagrange point L2

B) Lagrange point L1

C) Lunar orbit

D) Geostationary orbit

Answer: B – Explanation: From the Sun–Earth L1 point, Aditya-L1 watches the Sun without eclipses.

4. Solar energetic particles are mostly what?

A) Positrons

B) Neutrinos

C) Protons

D) Photons

Answer: C – Explanation: Particles hurled by flares and CMEs are mostly protons.

5. Which institute runs the Kodaikanal Solar Observatory?

A) Indian Institute of Astrophysics

B) TIFR

C) Physical Research Laboratory

D) ISRO

Answer: A – Explanation: The Kodaikanal observatory (1899) is under IIA; GRAPES-3 at Ooty is under TIFR.