7. Space Science- Science & Technology

Budget may cut reliance on foreign telescopes, but trips on space spending

The Union Budget 2026–27 allocates over ₹13,000 crore to the Department of Space to build world-class astronomy infrastructure like the National Large Optical-Infrared Telescope and Solar Telescope in Ladakh. This move aims to bridge gaps in optical and sub-millimetre capabilities, reduce reliance on foreign facilities, and leverage India's geographical advantages for deep-space research.

Context- Budgetary Push for Space Science

The Union Budget 2026–27 has allocated ₹13,416.20 crore to the Department of Space. This significant allocation signals a renewed strategic push towards deep-space exploration and astrophysics, moving beyond routine satellite launches.

Key Announcements in the Budget

The government has prioritized the development of advanced telescope infrastructure to position India as a global leader in astronomical research.

National Large Optical-Infrared Telescope (NLOT)- Prioritized construction of a 30-metre class telescope.

Aim- To provide domestic access to high-resolution optical and infrared observations.

National Large Solar Telescope (NLST)

Location- Proposed near Pangong Lake in Ladakh.

Funding- Received dedicated funding support to study solar physics and space weather.

Himalayan Chandra Telescope

Location- Hanle, Ladakh (one of the world's highest observatory sites).

Plan- A proposal for the upgradation of existing facilities to enhance observation capabilities.

COSMOS-2 Planetarium

Location- Amaravati.

Status- Nearing completion.

Objective- To boost science outreach and public engagement in astronomy.

Focus on Deep-Space Exploration- A large share of the allocation is directed towards frontier research in astrophysics.

Goal- To enable India to participate in cutting-edge global discoveries as a primary leader rather than a secondary collaborator.

Existing Infrastructure in India's Astronomy Ecosystem

India already possesses a robust foundation in space science, which serves as a springboard for these new initiatives.

Giant Metrewave Radio Telescope (GMRT)

Location- Near Pune.

Status- It is the world's largest low-frequency radio telescope array, providing critical data for radio astronomy.

IN-SPACe (Indian National Space Promotion and Authorisation Centre)

Established- 2020.

Role- Encourages public-private partnerships, allowing private entities to participate in the space sector.

AstroSat Mission

Significance- India's first dedicated multi-wavelength space observatory.

Impact- Has strengthened capabilities in space-based astronomy and produced globally recognised scientific output.

Physical Research Laboratory (PRL), Ahmedabad

Role- Plays a crucial role in planetary sciences, solar physics, and space astronomy.

Contributions- Key contributor to major missions like Chandrayaan and Mars Orbiter Mission (MOM).

Emerging Capabilities

AI & Data- Growing capabilities in AI-driven data processing centres.

Startups- An increase in space-tech startups collaborating with ISRO.

Rationale Behind Strengthening Domestic Infrastructure

The push for domestic facilities is driven by strategic, geographic, and scientific necessities.

Limited Global Access- Currently, only a few entities (U.S., China, Japan, EU) heavily invest in large terrestrial and space telescopes. Access is highly competitive, and Indian scientists often face restricted observation time at these foreign facilities.

Utilizing Geographical Advantage

Hanle and Pangong Lake (Ladakh)- These regions offer dark, high-altitude skies with minimal atmospheric interference and light pollution.

Optimality- These are considered some of the best sites globally for ground-based astronomy.

Arresting Brain Drain- Creating world-class domestic facilities can encourage talented students and researchers to pursue advanced research within India rather than moving abroad.

Strategic Positioning- Investments in astronomy lead to technological spillovers (advancements in optics, sensors, data science). Enhances national prestige and soft power in the global scientific community.

Gaps in India's Astronomical Infrastructure

Despite successes like GMRT and Astro Sat, significant critical gaps remain.

Lack of World-Class Optical Telescopes- India currently lacks a large-aperture optical telescope comparable to global standards (e.g., those in Hawaii or Chile).

Absence of Sub-Millimetre Capabilities- India does not possess telescopes operating in the sub-millimetre wavelength range.

Impact- This hinders research in key areas such as-

a. Studying proto-stellar disks.
b. Understanding galaxy formation.
c. Probing dusty star-forming regions.

Underutilization of Funds- Experts have flagged that actual expenditure often falls short of the budgetary allocations, leading to delays in project execution.

Way Ahead

To fully realize the potential of this budget allocation, the following steps are recommended-

Promote Public–Private Partnerships (PPP)- Expand private sector participation in space and astronomy instrumentation under the regulatory oversight of IN-SPACe.

Build Advanced Data Infrastructure- Invest significantly in AI-driven data analytics, high-performance computing, and big-data astronomy platforms to handle the massive data streams from new telescopes.

Strengthen Human Capital- Direct greater funding towards fellowships, postdoctoral programmes, and research grants specifically in astrophysics and planetary science to build a skilled workforce.

Source- https-//www.thehindu.com/sci-tech/science/budget-could-cut-reliance-on-foreign-telescope-trips-on-space-spending/article70607109.ece#google_vignette