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Loktak Protocluster: Manipuri Astrophysicist Names 12.6-Billion-Year-Old City of Galaxies

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Loktak Protocluster: Manipuri Astrophysicist Names 12.6-Billion-Year-Old City of Galaxies

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WHY IN NEWS:

Dr. Ronaldo Laishram — astrophysicist at the **National Astronomical Observatory of Japan (NAOJ)**, originally from Khangabok, Thoubal district, Manipur — has led an international team that discovered and named a **12.6-billion-year-old protocluster of galaxies** the **Loktak Protocluster**. The name honours Manipur’s iconic Loktak Lake because the four connected galaxy concentrations resemble the lake’s floating *phumdis*. Findings appear in *The Astrophysical Journal Letters* using observations from the **Subaru Telescope**; coverage emerged on May 26, 2026.

The naming bridges cutting-edge cosmology with India’s Northeast and showcases the diaspora’s growing role in global astronomy.

ABOUT THE LOKTAK PROTOCLUSTER

PARAMETER	DETAIL
Age	12.6 billion years
Cosmic era	“Cosmic noon” — peak star formation epoch
Light-emission moment	When the universe was ~1.2 billion years old
Universe’s current age	~13.8 billion years (Λ CDM cosmology)
Structure	4 connected galaxy concentrations
Future evolution	Gravity-bound precursor of a present-day galaxy cluster

What is a Protocluster?

- The earliest assembly stage of what will become a mature **galaxy cluster** — a “city of galaxies.”
- Galaxy clusters typically host **100–1,000 galaxies** and are the **largest gravitationally-bound structures** in the universe.

- Protoclusters offer a rare window into how the cosmic web and large-scale structure formed in the early universe.

ABOUT THE SUBARU TELESCOPE

FEATURE	DETAIL
Type	8.2-metre optical-infrared telescope
Location	Mauna Kea Observatory, Hawaii (4,200 m elevation)
Operator	NAOJ
First light	1999
Distinction	Among the largest single-mirror telescopes globally

About NAOJ

- **National Astronomical Observatory of Japan.**
- Headquartered in **Mitaka, Tokyo.**
- Founded in **1988.**
- Major facilities: Subaru (Hawaii), ALMA (Chile partnership), Nobeyama and Mizusawa observatories.

ABOUT LOKTAK LAKE — THE NAMESAKE

Loktak Lake is the cultural and ecological heart of Manipur, and the protocluster’s four-island morphology mirrors the lake’s floating *phumdis*.

FEATURE	DETAIL
Status	Largest freshwater lake in NE India
Location	Bishnupur district, Manipur
Area	~287 km ² (fluctuating)
Ramsar site	Since March 23, 1990 (#463 globally)
Within the lake	Keibul Lamjao National Park — only floating national park in the world (notified 1977)
Flagship species	Sangai deer (<i>Rucervus eldii eldii</i>) — Manipur's state animal
Sangai population	~260 individuals (2016 census)
Unique feature	Phumdis — floating biomass islands
Major threats	Loktak Hydroelectric Project, encroachment, eutrophication

INDIAN ASTRONOMY INFRASTRUCTURE

FACILITY	DETAIL
GMRT — Giant Metrewave Radio Telescope	Khodad, Pune; operated by NCRA-TIFR ; world-leading low-frequency radio telescope
ASTROSAT	Launched September 28, 2015 ; India's first multi-wavelength space observatory
Aditya-L1	Launched September 2, 2023 ; solar observation at L1 Lagrange point
TMT (Thirty Meter Telescope)	India is a 10% partner ; under construction at Mauna Kea (delayed)
SKA (Square Kilometre Array)	India joined as observer in 2023; full member in 2024 ; contributing to the TM consortium

INDIAN DIASPORA IN GLOBAL SCIENCE

- **C.V. Raman** — Nobel Prize in Physics, 1930.
- **S. Chandrasekhar** — Nobel Prize in Physics, 1983 (University of Chicago).
- **Hargobind Khorana** — Nobel Prize in Physiology or Medicine, 1968.
- **Venkatraman Ramakrishnan** — Nobel Prize in Chemistry, 2009 (MRC, Cambridge).

- Modern astronauts of Indian origin: **Sunita Williams, Raja Chari (NASA); Gp Capt Shubhanshu Shukla** flew on **Axiom-4 to the ISS in 2025**.

Sangai Deer Ecology

- Endemic to **Keibul Lamjao**.
- Locally called the “**Manipur brow-antlered deer**” or “**dancing deer**” because of its movement on phumdis.
- **IUCN status:** Endangered.
- **Wildlife (Protection) Act Schedule I**.
- Habitat health depends entirely on lake water levels that sustain phumdis.

WAY FORWARD

- Deepen **India–NAOJ collaboration**, especially via the TMT consortium and Subaru observing time.
- Leverage Indian-origin researchers for capacity-building in domestic astronomy.
- Protect Loktak Lake under the Ramsar framework and the **Manipur Loktak Lake Protection Act, 2006**.
- Expand astronomy outreach and research infrastructure across Northeast India.

UPSC RELEVANCE

- **GS Paper 3** — Achievements of Indians in science and technology; space and astronomy.
- **GS Paper 1** — Geography of NE India; wetlands and unique ecosystems.
- **Prelims** — Loktak Lake (Ramsar #463), Keibul Lamjao, Sangai deer, Subaru Telescope, ASTROSAT, Aditya-L1.
- **Mains** — Role of the Indian scientific diaspora; conservation of unique freshwater ecosystems.

FACTS CORNER

Loktak Protocluster — age 12.6 billion years.

Discoverer: Dr. Ronaldo Laishram, NAOJ (originally from Khangabok, Thoubal, Manipur).

Telescope: Subaru (NAOJ, Mauna Kea, Hawaii, 8.2 m).

Universe age: ~13.8 billion years.

NAOJ established 1988; HQ Mitaka, Tokyo.

Loktak Lake — largest freshwater lake in NE India; ~287 km².

Loktak Ramsar site since March 23, 1990 (#463 globally).

Keibul Lamjao NP — only floating national park in the world; notified 1977.

Sangai deer: ~260 individuals (2016 census); IUCN Endangered; Manipur's state animal.

Phumdis — floating biomass islands of Loktak.

GMRT — Khodad, Pune; NCRA-TIFR.

ASTROSAT launched September 28, 2015.

Aditya-L1 launched September 2, 2023.

TMT — India is a 10% partner; under construction at Mauna Kea (delayed).

SKA — India became a full member in 2024.

Subaru first light: 1999.

Sources: [NAOJ](#), [The Astrophysical Journal Letters](#), [PIB](#)

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