



Contributions of Jayant Narlikar

Why in News?

On 20th May 2025, renowned astrophysicist **Professor Jayant Narlikar** passed away in Pune, Maharashtra. He was best known for **developing 'Steady-State Theory', an [alternative model of the universe](#)**.



Key Points

- **His Contributions:**
 - **The Hoyle-Narlikar Collaboration:**
 - Narlikar is best known for developing the Hoyle-Narlikar theory alongside his PhD mentor Fred Hoyle, a prominent figure in 20th-century astrophysics.
 - Their work **supported the Steady-State Theory**, an **alternative to the [Big Bang model](#)**, suggesting the **universe is eternal and unchanging in density due to continuous creation of matter**.
 - **Core Concepts of the Steady-State Theory:** Unlike the Big Bang theory, which proposes a single explosive origin for the universe, the **steady-state model argues that the universe has no beginning or end**.
 - The theory **acknowledges the expansion of the universe but maintains that new matter is constantly created**, preserving uniform density.
 - **Mathematical Innovations:**
 - Narlikar played a **key role in modifying [Einstein's general relativity](#)** to support the creation of matter.
 - It was proposed that **gravity could be influenced not just by local objects, but also by distant matter across the universe**—a revolutionary idea in gravitational physics.

- He emphasized that a constant density in an expanding universe necessitates continuous matter creation—a cornerstone of the steady-state view.
- **Gradual Decline of the Theory:** The discovery of [Cosmic Microwave Background \(CMB\) radiation](#) in 1965 dealt a **significant blow to the steady-state model**.
 - The CMB is a faint, nearly uniform glow of microwave radiation that fills the observable universe. It is often referred to as the **"afterglow" of the Big Bang**.
 - CMB's properties aligned closely with Big Bang predictions, providing strong evidence of a primordial explosive event.
 - **Shift in Scientific Consensus:** Further observations—such as **evolving galaxies**, and **theoretical advancements by Stephen Hawking and Roger Penrose on singularities**—bolstered the Big Bang theory.
 - Despite these shifts, Narlikar remained critical of the Big Bang's unresolved assumptions and argued for re-examining alternative models.
 - **Enduring Scientific Legacy:** Though the steady-state theory fell out of favour, Narlikar's **mathematical frameworks and methodological innovations remain relevant**.
 - His work continues to be cited and applied in cosmological and gravitational studies.

▪ **About Professor Jayant Narlikar:**

- **Early Life and Academic Excellence:**
 - **Born on July 19, 1938**, Dr. Jayant Narlikar grew up on the campus of Banaras Hindu University (BHU), where his father, Vishnu Vasudeva Narlikar, served as Professor and Head of the Mathematics Department.
 - He **pursued higher education at the University of Cambridge**, where he distinguished himself as a **Wrangler and Tyson Medallist** in the Mathematical Tripos — an honour awarded to top-performing mathematics students.
- **Founding of IUCAA:**
 - In 1988, the [University Grants Commission \(UGC\)](#) entrusted Dr. Narlikar with establishing the **Inter-University Centre for Astronomy and Astrophysics (IUCAA)** in Pune.
 - He served as the Founding Director of IUCAA until his retirement in 2003, after which he was designated Emeritus Professor.
 - IUCAA, under his leadership, emerged as a globally respected centre for advanced research and teaching in astronomy and astrophysics.
- **National and International Honours:**
 - In recognition of his efforts in science popularisation, [UNESCO](#) honoured him with the **Kalinga Award in 1996**.
 - The Government of India awarded him the [Padma Bhushan](#) in 1965, making him one of the **youngest recipients at the age of 26**.
 - He received the **Padma Vibhushan in 2004**, and the **Maharashtra Bhushan**, the state's highest civilian honour, **in 2011**.
 - In 2012, the **Third World Academy of Sciences (TWAS)** awarded him for establishing a leading centre of excellence in scientific research.
- **Literary Contributions:**
 - In 2014, his autobiography was selected by the [Sahitya Akademi](#) for its highest award in regional language (Marathi) writing, further cementing his legacy as a versatile intellectual.

A promotional banner for the MPSC Prelims Course. The background is a light beige color with a subtle pattern. At the top, the title 'MPSC Prelims Course' is written in a large, bold, dark red font. Below the title, the text 'Mode: Online | Medium: Marathi and English (Bilingual mode)' is displayed in a smaller, dark grey font. In the center, a white rounded rectangle contains the text 'Admissions Open' in a bold, dark red font. Below this, there are three white rounded rectangles, each containing a benefit of the course. The first rectangle on the left says 'Course Validity 1 year from the date of commencement of the batch'. The middle rectangle says 'Free access to 10 Mock Tests Online mode via Drishti Learning App'. The third rectangle on the right says 'Facility to watch Each class an Unlimited number of times.' The banner is decorated with illustrations of various Indian architectural landmarks, including the Gateway of India, the Taj Mahal, and the Leaning Tower of Pisa, along with a sun and clouds in the background.

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Big Bang Theory

- **Origin of the Universe:** Proposed by **Georges Lemaître in 1927**, the Big Bang Theory explains how the universe began as a **single, infinitely small and hot point** that expanded and stretched to create the vast universe.
- **Evidence and Confirmation:** **Edwin Hubble** later confirmed this idea by observing galaxies **moving away from us**, indicating that the universe is still expanding.
 - **Visible and ultraviolet light** from distant galaxies shift to the **infrared wavelengths** as the universe expands.
- **Formation of Celestial Bodies:** As the universe expanded, it **cooled**, allowing particles to form atoms, which then combined to create celestial bodies such as **planets, asteroids, comets, and black hole.**

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