

# भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद

**Physical Research Laboratory, Ahmedabad** 

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73\_PRL Ka Amrut Vyakhyaan

Wednesday, 21 December 2022

## @ <u>04:00 PM</u> (IST)

"Galaxy evolution: The atomic hydrogen perspective"

## **Prof. Jayaram Chengalur**

Distinguished Professor & Director Tata Institute of Fundamental Research, Mumbai





### https://youtu.be/RTzOyLyxGt0











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### Title: "Galaxy evolution: The atomic hydrogen perspective" Speaker: Prof. Jayaram Chengalur

Distinguish Professor & Director, Tata Institute of Fundamental Research (TIFR), Mumbai.

On

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#### Abstract

As galaxies evolve they convert their gas into stars. On a cosmic scale, it is well established that the star formation peaked about 10 billion years ago (redshifts ~2-3) and that the average star formation rate of the universe has declined sharply since then. Atomic Hydrogen is the primary fuel for star formation; stars form as the gas cools to become molecular hydrogen, which then cools further and collapses under self gravity. Understanding the evolution of the atomic hydrogen content of galaxies is hence important to understanding the evolution of the star formation rate with cosmic time. Unfortunately, because of the difficulties in detecting atomic hydrogen emission (via its best tracer, the 21 cm spectral line), until recently very little was known about the evolution of the gas content of star forming galaxies. The speaker will discuss results from ongoing atomic hydrogen surveys of star forming galaxies using the upgraded Giant Meterewave Radio Telescope (uGMRT) that have significantly added to our understanding of the evolution of the baryonic content of galaxies.

#### **The Speaker**

Prof. Jayaram Chengalur, currently a Distinguished Professor & Director at TIFR has done B. Tech. (EE) from the IIT Kanpur and obtained Ph.D. in Astronomy from Cornell University. Following a postdoctoral position in the Netherlands he joined NCRA-TIFR in 1996. His research interests include studies of galaxy structure and evolution, the Interstellar Medium of our galaxy, as well as development of astronomical instrumentation and software. He is a Fellow of the Indian Academy of Sciences, the National Academy of Sciences, India, and the Indian National Science Academy. He is a receipt of Shri Hari Om Ashram Prerit Dr. Vikram Sarabhai research award (2009) for his research work in Radio Astrophysics, particularly towards understanding dark matter in dwarf galaxies and characteristics of the interstellar medium using the Giant Metrewave Radio Telescope.



### **About PRL**

The Physical Research Laboratory (PRL), known as the "cradle of space science" in India, is one



of the premier research institutes founded in 1947 by Prof. Vikram Sarabhai, a renowned Cosmic Ray Scientist, a great visionary and institution builder. PRL played a seminal role in producing a highly motivated cadre of space scientists and the technologists of highest international repute. The first scientific rocket launched from Thumba on 21st November-1963 and many other rockets launched thereafter contained payloads developed at PRL. Dr. Sarabhai initiated many of these scientific and technical activities at PRL which eventually led to the formation of the Indian Space Research Organization (ISRO). Therefore, PRL is known as the "cradle of space science" in India. Further, the research in the area

of Plasma Physics expanded to the formation of the Institute of Plasma Research (IPR).

As an institution PRL is unique in that it conducts fundamental research in a wide range of research areas from the Earth to the cosmos, and comprising Astronomy and Astrophysics; Solar Physics; Space and Atmospheric Sciences; Theoretical Physics; Geosciences; Atomic, Molecular and Optical Physics, Astrochemistry; and Planetary Sciences and Space Exploration. PRL is one of the rare research institutes of international repute wherein research in such diverse fields of sciences is carried out using several state-of-the-art experimental facilities that exist under one umbrella.

Along with the ongoing research, several new initiatives have been taken up during the last few years. The Multi-Application Solar Telescope (MAST) at Udaipur Solar Observatory has been operationalized. PRL initiated scientific programmes in frontier areas of research, which include a search for exo-planets, laboratory studies of interstellar grains, laboratory synthesis of cold astromolecules and experimental studies in the field of quantum optics. PRL is also developing several scientific payloads as a part of ISRO's larger vision and contributing to roadmap for competitive scientific exploration of the solar system and beyond. In particular, PRL has been contributing significantly not only in building instruments for space missions, such as Chandrayaan-1, Chandrayaan-2, AstroSat and upcoming Aditya-L1, Chandrayaan-3 and planetary and space missions, but also by bringing out new and insightful science results.

PRL contributes to several national and international research programmes and to human resource development through its Doctoral and Post-Doctoral Programmes, capacity building programmes, such as UN Course on Space Science, and science and engineering internship programmes. PRL contributes significantly to society through its Outreach Programmes by periodically organizing science exhibitions and Open Houses, planned visits of students of various school and college to PRL, and popular talks at various institutions to not only share the excitements of the advancements of contemporary scientific findings but also to encourage students to take up sciences as their research career.

