भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद

Physical Research Laboratory, Ahmedabad

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PRL Ka Amrut Vyakhyaan-29

Wednesday, 16 February 2022

@ 04:00 PM (IST)

"Human Space Program - challenges and strategies"

Dr. V. R. Lalithambika

Distinguished Scientist & Former Director,
Directorate of Human Space Programme,
Indian Space Research Organization, Bangalore.

https://youtu.be/6B1DPeyGwfA

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Abstract

Drivers for space exploration have conventionally been space science and human spaceflight. India's first experience of human spaceflight came through the collaborative venture with USSR for the mission to Salyut 7, which has given both tangible and intangible benefits. With extensive experience in conventional spacecraft missions, we are now on the cusp of embarking upon our own human space program.

The talk highlights the challenges involved in crewed space exploration and the various developments needed in the technological, and the human centric domains needed to make human space flight a reality. The mission related challenges in the launch, orbital and crew return phases are also discussed in detail.

The Speaker

Dr. V. R. Lalithambika graduated in Electrical Engineering in 1984 and followed on with Masters in Control Engineering from the College of Engineering, Trivandrum. She joined Vikram Sarabhai Space Centre (VSSC), ISRO, in 1988 after a brief stint in teaching at the NIT, Kozhikode. She did her PhD in 2009. Her research interests are in Aerospace mission, navigation, guidance, control, simulation and human spaceflight. Until superannuation in January 2022, she has been designated as Distinguished Scientist and the first Director, Directorate of Human Space Programme at ISRO, she has played a nodal role in defining goals and targets and policy-shaping for the Indian Human Space Programme, crew selection and training and technological systems finalization for Gaganyaan, the establishment of the human spaceflight centre and synergizing the national effort in this direction. She has also been the ISRO side chair of human spaceflight joint working groups with major space agencies. In her earlier position as Deputy Director, Vikram Sarabhai Space Centre, up to 2018, she was responsible for guidance and control design, mission analysis and integrated simulation activities of all ISRO launch vehicles and has played a major role in their success. She is a Fellow of the Indian National Academy of Engineering- (currently Governing Council member of INAE) Institution of Engineers, India. For her contributions to Indian Aerospace, she has been conferred with the INAE Woman Engineer of the Year Award (R & D) 2020, ISRO performance excellence award in 2013, ISRO merit award in 2010, Astronautical Society of India Space Gold Medal in 2001. Some other noteworthy recognitions include Woman achiever in aerospace 2019 at Aero - India 2019, Marie Curie Mahila Vijnana Puraskara by Swadeshi Vijnana Andolana, 2018 and Doctor of Science (Honoris Causa) by Sathyabama University in 2017. She has more than sixty peer-reviewed publications to her credit and has delivered more than sixty lectures all over the country and in international fora. She is also a Member of the Astronautical Society of India, Aeronautical Society of India and Systems Society of India.

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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.

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