



भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद

Physical Research Laboratory, Ahmedabad

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42_PRL Ka Amrut Vyakhyaan

Wednesday, 18 May 2022

@ 04:00 PM (IST)

“Infrared eyes: Exploring the solar system using infrared instruments”

Prof. Philip R. Christensen

Regents' Professor, Geological Sciences
Ed and Helen Korrick Professor, School of Earth and
Space Exploration
Arizona State University, USA.



<https://youtu.be/gkR2CBXXI7s>



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Abstract

Thermal infrared observations have made significant contributions to planetary science over the past 50 years. Infrared spectroscopy has shed light on the composition of planetary surfaces and atmospheres, and thermal radiometry has provided great detail on the physical properties of planetary regoliths and their formation processes. Infrared instruments have been on virtually every planetary spacecraft, and these instruments have improved steadily over the past three decades. A great deal has been learned about the geology of Mars from a suite of thermal infrared instruments beginning with Mariner 6/7/9 and Viking, and continuing through Mars Global Surveyor, the Mars Exploration Rovers, and Mars Odyssey. Derivatives of these instruments have studied the asteroid Bennu on OSIRIS-Rex, Mars on the UAE Hope Mars mission, and are on the way to the Trojan asteroids on the Lucy mission. This talk will discuss some of the major discoveries that have come from these data and what we've learned from them about planetary processes and geology over the past 40 years – and will provide a few thoughts on the future of planetary exploration using thermal infrared observations.

The Speaker

Prof. Philip R. Christensen is a Regents' Professor and the Ed and Helen Korrick Professor in the School of Earth and Space Exploration at Arizona State University. His research interests focus on the composition, processes, and physical properties of Mars, Earth, asteroids, Europa, and other planetary surfaces. Prof. Christensen uses spectroscopy, radiometry, field observations, and numerical modeling to study the geology and history of planets and moons. A major facet of his research is the development of spacecraft instruments, and he has built seven science instruments that have flown on NASA's Mars Observer, Mars Global Surveyor, Mars Odyssey, Mars Exploration Rover, OSIRIS-REx, and Lucy missions and the UAE's Hope Mars orbiter. He is currently developing an infrared camera for the Europa Clipper missions. Over the past 20 years he has developed an extensive K-12 education and outreach program to bring the excitement of science and exploration into the classroom and has mentored 32 outstanding Ph.D. students. Prof. Christensen is a Fellow of the American Geophysical Union and the Geological Society of America and received the AGU's Whipple Award in 2018, the GSA's G.K. Gilbert Award in 2008, NASA's Public Service Medal in 2005, and NASA's Exceptional Scientific Achievement Medal in 2003. He received his Ph.D. in geophysics and space physics from the University of California, Los Angeles. Prof. Christensen is the co-chair of the National Academies Planetary Science and Astrobiology Decadal Survey and has previously served as the chair of the Mars Panel of the Planetary Science Decadal Survey in 2010-2011 and as the co-chair of the NRC's Committee on Astrobiology and Planetary Science from 2012-2015.



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 astro-molecules 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.

