

# **IIT Delhi Physics Department Seminar**

**Date: November 10, 2021**

**Time: 6 PM (IST)**

## **Speaker**



**Kumar Krishen, Ph.D.**

**Fellow, SDPS, Fellow and Distinguished Speaker IETE**

# Presentation Title

## New Technology Innovations with Potential for Space Exploration

### Abstract

Human exploration and development of space is one of the key strategic enterprises being pursued by space faring nations for opening the space frontier by exploring, using and enabling the development of space, and expanding the human experience into the far reaches of space. The goals outlined in these programs include, increasing human knowledge of nature's processes using the space environment; exploring and settling the solar system; achieving routine space travel; and enriching life on Earth through living and working in space. A crucial aspect of future space missions is envisioned as the development of infrastructure to optimize the safety, productivity, and costs. A major component of the mission execution is operations management. NASA's International Space Station is providing extensive experience in both infrastructure and operations. Operations include planning; scheduling; training; real time monitoring of data and systems; command and control; communications; and post mission data analysis. In view of this enormous scope, a vigorously organized approach is needed to implement successful space, planet, and ground-based research and operations. This entails wise and efficient use of both technical and human resources.

Many revolutionary technologies currently being pursued by research and technology (R&T) communities may find an important role in making space missions safe, reliable, cost-effective, and productive in terms of research and space development. These include: Wavelet Technology, Advanced Space Suit Technology, New Sensor Technology (Temperature, Atmosphere, Gases, Biological, Human Health), Autonomous Systems (Augmented Reality, Fuzzy logic, Neural Networks), Nano Technology (Coatings, Composite materials), Intelligent/ Smart Materials (Actuators and sensors), Superconductor Technology, Tera Hertz Technology, Quantum Vacuum Plasma Thruster (Q-Thruster) Technology, Variable Specific Impulse Magnetoplasma Rocket (VASIMR®) Engine, Habitation Waste Water Recovery Technology, Biodigesters (Waste-to-Fertilizer Conversion Technology), Laser Processed Heat Exchangers, In-Situ Resource Utilization Technology, Methane Production, Water Processing, Oxygen Production, Augmented Reality Environment for Space Exploration Applications, Pulsar Navigation for Crewed Exploration of the Solar System, Radiation Shielding Expandable Structures/Habitats, Shape-Morphing Adaptive Radiator Technology, and Effects of Dust and Dust Storm Alleviating/Reducing Technology/Systems. A few of these will be discussed in this presentation.

# Brief Biography

Currently, Dr. Krishen is Adjunct Professor, University of Houston, Honorary Professor, Delhi Technological University, and Honorary Distinguished Professor, Amity University Haryana.

Dr. Kumar Krishen has supported space exploration from January 1965 and was with NASA in various capacities from February 1976 to September 2018.

Dr. Krishen has served as Innovation Champion and ST/ Chief Technologist for NASA Johnson Space Center (JSC) and represented JSC as the Principal Technologist on the NASA Council on Science and Technology. Dr. Krishen served at Virginia Tech as University Fellow for Technology Transfer, Office of Special Initiatives, and Visiting Professor on a special NASA assignment. He has also served as Adjunct Professor at Rice University. Authoring more than 170 technical papers/reports/proceedings, Dr. Krishen is a Fellow of the Society for Design and Process Science (SDPS), Fellow and Distinguished Speaker of the Institution of Electronics and Telecommunication Engineers (IETE), and an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA). Dr. Krishen's academic degrees are from Kansas State University (Ph.D. and M.S.-Phi Kappa Phi, Eta Kappa Nu & Sigma Xi honors), Calcutta University (M. Tech and B. Tech- Gold & Silver Medals), and Jammu and Kashmir University (B.A.- Highest Univ. Merit) in electronics, electrical engineering, radio physics, physics, and mathematics.

Dr. Krishen received the NASA Exceptional Service Medal in September 2018 recognizing his exceptional and sustained service to NASA and the United States in the realm of technological advancements in support of Human Spaceflight.