



**S N BOSE NATIONAL CENTRE  
FOR BASIC SCIENCES**

*Block JD, Sector III, Salt Lake, Kolkata 700 106*

## **DEPARTMENTAL SEMINAR**

# **Department of Astrophysics and High Energy Physics**

**08<sup>th</sup> January, 2026**

**12.00 Noon**

**FERMION / ONLINE**

### **SPEAKER**



**Dr. Ashok Kumar, Associate Professor, Indian Institute of Space Science & Technology, Thiruvananthapuram**

Dr. Kumar did his Ph. D from Physical Research Laboratory, Ahmedabad, India. His main research areas are Experimental Quantum Optics, Quantum Sensing, Quantum-Enhanced Imaging, Quantum Communication and Quantum Cryptography, Bright Squeezed States, Quantum Plasmonic Sensors, Electromagnetically Induced Transparency, Orbital Angular Momentum of Light.

### **TITLE OF THE TALK**

**Bright Squeezed Light: From EPR Entanglement to Quantum Technologies**

### **ABSTRACT**

Quantum technologies leveraging squeezed light have emerged as powerful tools for revolutionizing quantum communication, sensing, and computation. This talk will describe how we have used two-mode bright squeezed states of light for information encoding and quantum-enhanced sensing. It will explain the generation of squeezed light in the lab through the non-linear optical interaction of lasers with hot atoms, followed by a demonstration of the EPR paradox with these beams to conclusively illustrate their entanglement. The talk will then discuss how these entangled beams are crucial not only for fundamental sciences but also for encoding information by manipulating their spatial correlations. Building on this level of control, I will highlight how engineered correlations can be used to realize strongly correlated quantum random number generation, demonstrating a concrete application enabled by bright squeezed light. I will conclude with our recent results showing that bright two-mode squeezed light can serve as a useful resource for a distributed network of optical gyroscopes.

### **HOST FACULTY**

**Prof. Archan S Majumdar**

**Dept. of ASTROPHYSICS AND HIGH ENERGY PHYSICS**

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