

**Loyola Physics Association - Lecture Series for the Academic Year
2023-2024**

Title: Introduction to Quantum Optics

Date: August 1, 2023 Time: 11:30 a.m. Venue: JG-14 Centennial PhD Hall

Resource Person: Dr. G. Sreekumari



LOYOLA COLLEGE(AUTONOMOUS), CHENNAI - 34
LOYOLA PHYSICS ASSOCIATION
DEPARTMENT OF PHYSICS

Lecture Series - 1
2023-2024

*Introduction to
Quantum Optics*

Dr. G. Sree kumari
Department of Physics
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August 1, 2023
Ph. D Centennial Hall
~ 11:30 am ~

The session on Introduction to Quantum Optics held on August 1, 2023, as part of the Loyola Physics Association's Lecture Series for the academic year 2023-2024, was an engaging and interactive experience for the students. Dr. G. Sreekumari, the resource person, enthused the audience with her expertise and passion for the subject.

Quantum optics formed the bedrock from which a multitude of quantum mechanical phenomena such as quantum computation, communication, cryptography, entanglement, teleportation, and more emerged. The talk highlighted how classical computers are hitting the quantum wall with miniaturisation, emphasising the need for quantum computation and quantum computers.

Dr. Sreekumari's explanations of the concept of qubits, the fundamental building blocks of quantum computation, resonated with the students. The two-level system, represented by the ground state ($|\downarrow\rangle$) and an excited state ($|\uparrow\rangle$) of a Rydberg atom, and the remarkable property that any linear combination of these states is a valid qubit state, sparked lively discussions.

The session also shed light on the role of light as an ideal candidate for information transfer, playing a similar role to electricity in classical computers. The concept of electrodynamic cavities, capable of trapping photons and keeping atoms stationary, further deepened the students' understanding.

Throughout the lecture, Dr. Sreekumari encouraged active participation, welcomed questions, and fostered discussions. Her enthusiasm and expertise in the subject inspired the students and ignited their curiosity.

The lecture further explored the dynamics of the atom-cavity system, and the potential of arrays of cavities with inter-cavity coupling as transmission channels for quantum information transfer. The mathematical modelling of the atom-cavity system was introduced, providing students with valuable insights into the

practical aspects of quantum optics.

In conclusion, the lecture on Introduction to Quantum Optics not only covered essential concepts but also succeeded in creating an interactive and stimulating learning environment. Dr. G. Sreekumari's passion for the subject and her ability to engage with the students left a lasting impression and set the tone for an exciting journey into the world of quantum optics.

