



## Daniel Sahagun (UNAM)

October 13, 2025 to October 17, 2025

Instituto de Fisica, UNAM (Mexico)

---

**"Atomic quantum optics: An insight to systems of photons and atomic ensembles"**

### **Abstract:**

Qubits are the basic units carrying quantum information. They may be constituted in any two-level quantum system. This lecture focuses on two of them, which can interchange information: the polarization of light and alkali atoms. It uses a brief review of the density-matrix operator as the basis to understand how one can calculate the optical field generated by an ensemble of two-level atoms interacting with laser light. Following, it studies a protocol of quantum tomography for analyzing the polarization of the generated light. Finally, this lecture describes some experiments for generating heralded-photon pairs suitable to interact with atomic ensembles and to build quantum memories based on atomic gases as the building blocks of a quantum network.

**Bio:**

We are founding the National Laboratory for Quantum Matter - LANMAC. It is formed by the Group of Time and Frequency from the Mexican National Metrology Centre (CENAM), the Atomic Physics with Cold Atoms Group of the University of San Luis Potosi, Mexico, and the Cold Atoms Group of the Institute for Nuclear Science of the National Autonomous University of Mexico (UNAM).

The National Laboratory for Quantum Matter kicks off in 2014 by setting up two more laboratories at UNAM in its Institute of Physics. One of this laboratories will be dedicated to study the physics of ultra-cold Fermions and Bosons. The other one will be dedicated to quantum entanglement and laser spectroscopy.

We have general funding from the National Council of Science and Technology under the new frame for National Laboratories and from each local Institution.