XVII Symposium of Lasers and its Applications

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◉ Departamento de Física - UFPE - Recife - Pernambuco - Brasil

About

The Symposium of Lasers and its Applications is an annual scientific event promoted by OPTICA Student Chapter-Recife, dedicated to the exposition of ideas and discussions among researchers, professors, students, and professionals interested in the field of Optics. Our main objective is to disseminate the latest techniques involving the use of lasers and their applications in the fields of Physics, Medicine, Communication, among others.

This annual event has been running for more than 10 years and your participation will be more than welcome in this edition celebrating the International Year of Quantum Science and Technology.

Luis G. Marcassa

UFSCar

Rydberg Atoms for MW Quantum Sensors

Abscract: Atom-based sensing systems offer remarkable benefits due to their inherent self-calibration as quantum entities. The properties of atoms remain identical for all atoms of a given species, regardless of their location in the universe. This intrinsic stability, which is tied to fundamental constants, provides significant advantages, as atoms are naturally immune to manufacturing imperfections or aging effects. In this context, Rydberg atoms have attracted considerable attention in recent years because of their exceptionally broad range of transition frequencies, spanning from 1 MHz to 1 THz. This wide range arises from the Coulomb potential, which allows for an infinite number of electronic states and, consequently, an infinite number of Rydberg transitions.

These transitions feature large dipole matrix elements, with some values exceeding the D2 transition in alkali atoms by factors of 100−1000. Such characteristics make Rydberg atoms highly sensitive to electromagnetic radiation across their transition frequency spectrum. In this seminar, I will discuss the use of hot Rydberg atoms as microwave quantum sensors and their role in advancing quantum technologies. Show Less