POST-DOCTORAL POSITION – 2 Years

Laboratory: Institut de Physique de Nice (INPHYNI), Valbonne, France

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Team webpage: https://inphyni.cnrs.fr/sites/teams/cold-atoms/

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Dates: January 2021 – December 2022 (2 years)

Intensity correlations to probe quantum correlations in a cold atomic cloud

Subject and objectives.

Cold atoms coupled to photons are a promising platform for quantum information, computation and communication: atoms are adequate systems to store and/or correlate photons, while the photons themselves can be efficient carriers of information over great distances. In our project, we focus on one specific tool: sources of correlated photons, exploiting collective, multimode quantum states of atomic ensembles. The main scientific objective of this project is to explore a new kind of correlated photon source based on a multi-atom ensemble.

This source of correlated or heralded photons will be based on the correlations inside the Mollow triplet [1], on the light inelastically scattered by a cold atomic cloud. Taking advantage of the large number of emitters (10⁸ to 10⁹ atoms), this could pave the way to the generation of intense beams of correlated photons. Such quantum correlations are usually observed on single emitters (atom, ion, quantum dot, etc) and are hidden when the number of emitters is increased. The main barrier to be lifted will be to find an experimental configuration which will enable detecting quantum correlations between the photons scattered by a multi-atom source.

The first step towards this long-term goal will be to address a genuine signature of quantum correlations between atoms, at this time theoretically studied in the framework of our collaboration with theoreticians in Brazil [2]. This signature will be first scrutinized thanks to intensity correlation measurements applied on the light scattered by the cold atomic sample, and which have already been shown to be a powerful technique to give information on the light matter interaction such as the effect of single or multiple scattering [3]. This part is mainly experimental but numerical studies could be also possible.


Activities.

- Experimental work on a Rb cold atom experiment
- Search for quantum signature (quantum correlations between atoms , in the light matter interaction,...) in the light scattered by a multi-atomic ensemble
- Supervision of 1 or 2 PhD students

Qualifications/Experiences.

- PhD thesis
- Knowledge of optical and atomic physics experiments
- Experience on cold atom experiments is essential
- Experience in numerical scientific computing (MATLAB, Python,...)
- Languages: French or English
- Serious and motivated, good communication skills and ability to work independently

How to submit your application for this position.

Applicants should apply on the CNRS platform https://bit.ly/3d7bVHn
Please send detailed CV and letters from 2 ou 3 previous supervisors