DANIEL SALART SUBILS 'Design and Applications of Caesium Gas Microcells'

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Danish Center for Quantum Optics (QUANTOP)

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Seminar, March 27, 2015, 12:00. Seminar Room

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Until recently, experiments with room-temperature Caesium gas cells were limited to gaussian quantum states. Experiments with other states like single photons produce light states with bandwidths on the order of megahertz or more which are unsuitable for the interaction times of milliseconds needed to obtain a strong coupling constant. Also, since state transfer protocols rely on averaged spatial atomic modes, with shorter interaction times

the atoms cannot cross the beam several times. The properties of the anti-relaxation coating do not allow heating the atoms to significantly increase the gas density. Classical noise and the particularities of the detection system prevent the use of more optical power. However, this problem can be solved by scaling down the cell dimensions. The coupling constant scales in the same way with time as with the inverse cross-section, so the interaction pulse duration can be decreased maintaining the coupling constant and the number of wall collisions per atom per pulse. These microcells can also be used for quantum noise limited magnetometry and other experiments.

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Hosted by Prof. Morgan Mitchell