SFB/TRR 21 - Seminar

23. September 2016, Stuttgart

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Optical non-linearities using Rydberg polaritons in a cavity

Quantum states of light are potential candidates for quantum communication as they are robust against environmental decoherences and can be easily incorporated into existing optical channels[1]. A challenging task is to make photons interact with each other to perform gate like operations[2,3]. Atoms excited to high level principal quantum numbers called Rydberg atoms can help us achieve this goal[4,5]. They interact strongly using dipole-dipole interactions even when separated by few microns[6]. We trap a cold atomic cloud inside a low finesse cavity which can transform non-linear losses into non-classical photonic states. I will present our experimental measurement of optical non-linearities using cavity enhanced Rydberg ensembles[7]. I will also present a theoretical proposal for photonic phase gate using our setup [8].

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