Abstract Submitted
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Light scattering from a dense and ultracold atomic gas[1] DMITRIY KUPRIYANOV, IGOR SOKOLOV, Department of Theoretical Physics, State Polytechnic University, 195251 St.-Petersburg, MARK HAVEY, Department of Physics, Old Dominion University, Norfolk VA 23529 — The quantum optical response of high density ultracold atomic systems is important to a wide range of fundamentally and technically important physical processes. We present here a microscopic analysis of the light scattering on such a system, and compare it with a corresponding description based on macroscopic Maxwell theory. Results are discussed in the context of the spectral resonance structure of the scattering cross section, the time-dependent response under a range of conditions, and evolution of these quantities as the atomic density is varied. For high atomic densities, the microscopic theoretical treatment reveals a distributed and configuration dependent narrow resonance structure. This structure is attributed to microcavity spatial structures associated with the dense and ultracold atomic gas.

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