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Localized magnetoplasmons in quantum dots: Scrutinizing the eligibility of FIR, Raman, and electron energy-loss spectroscopies M. KUSHWAHA, Rice University — We report on a one-component, quasi-zero dimensional, quantum plasma exposed to a parabolic potential and an applied magnetic field in the symmetric gauge. If the size of such a system as can be realized in the semiconducting quantum dots is on the order of the de-Broglie wavelength, the electronic and optical properties become highly tunable. Then the quantum size effects challenge the observation of many-particle phenomena such as the magneto-optical absorption, Raman intensity, and electron-energy-loss spectrum. An exact analytical solution of the problem leads us to infer that these many-particle phenomena are, in fact, dictated by the generalized Kohn's theorem in the long-wavelength limit. Maneuvering the confinement and/or the magnetic field furnishes the resonance energy capable of being explored with the FIR, Raman, or electron-energy-loss spectroscopy. This implies that either of these probes should be competent in observing the localized magnetoplasmons in the system. A deeper insight into the physics of quantum dots is paving the way for their implementation in such diverse fields as quantum computing and medical imaging[1]. 1. M.S. Kushwaha, Unpublished.

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