

Abstract Submitted
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Optical Phonons and Multiphonon Raman Scattering in Spherical PbSe Quantum Dots¹ SERGEI KLIMIN, VLADIMIR FOMIN, JOZEF DEVREESE, TFVS, Departement Fysica, Universiteit Antwerpen, B-2610 Antwerpen, Belgium, YUL HYUN, FRANK WISE, Department of Applied Physics, Cornell University, Ithaca, New York 14853, USA — The experimentally observed multiphonon resonant Raman scattering spectra in spherical PbSe quantum dots are interpreted using our non-adiabatic approach [1]. The optical phonons in quantum dots are treated within the multimode dielectric continuum model, taking into account both the electrostatic and mechanical boundary conditions for the relative ionic displacement. Our multimode dielectric continuum model, which includes, as a substantial ingredient, the realistic dispersion of optical phonons, adequately describes the optical-phonon spectra of spherical PbSe quantum dots. The non-adiabaticity leads to a substantial enhancement of the relative intensities of multi-phonon peaks with respect to the intensity of the one-phonon peak. The peak positions and intensities of the calculated Raman scattering spectra for spherical PbSe quantum dots are in good agreement with recent experimental results on the Raman scattering in oleic-acid-capped colloidal PbSe nanocrystals. [1] E. P. Pokatilov, S. N. Klimin, V. M. Fomin, J. T. Devreese, and F. W. Wise, *Phys. Rev. B* **65**, 075316 (2002).

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