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Abstract

The long-wave optical modes of vibration in an ionic crystal sphere have been determined, including retardation of the Coulomb forces. These modes, which correspond to coupled excitations of phonons and photons, are also known as polaritons. Their frequencies are complex, the imaginary parts arising from both anharmonic and radiative damping; hence they are virtual modes. It is found that the mode frequencies depend on the radius of the sphere only if retardation is included. The absorption and extinction cross sections for spheres of various sizes are calculated as a function of the frequency of the incident light, and it is shown how the structure in the cross sections is related to the properties of the virtual modes. The theory is used to explain the position and width of an optical absorption peak measured in a polyethylene film containing UO_2 particles.

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Usually, in crystal optics the dependence of the di-electric function on the wave vector k is neglected be-cause the wave length λ is much larger than interatomic length scales s and eects of spatial dispersion are ex-pected to be of the order of $s/\lambda \ll 1$, see Refs. 1,2 and references therein. As a generic example of a spatially dis-persive resonance we choose the simplest model of one optical phonon band in an ionic crystal5 (also describing certain excitons1) and study the optical properties of the isotropic phonon-polariton, which is the lattice vibration coupled to light. Thereby, we determine under what cir-cumstances similar eects can be expected in a large class of systems and clarify the origin of previous results for the highly anisotropic plasmon obtained in Ref. Theoretical treatments of surface optical modes of vibration have been given by a number of workers,(1–4) but to date explicit results have not yet been reported for wave vectors (parallel to the surface) significantly different from zero using three-dimensional models which are rotationally invariant. In the present paper such results are obtained for a model of a NaCl-type lattice with nearest and next-nearest neighbor central forces. Surface optical modes are also investigated for a continuum model for which assumptions of short-range interactions are unnecessary. Keywords. Dispersion Curve Ionic is the app platform for web developers. Build amazing mobile, web, and desktop apps all with one shared code base and open web standards. Ionic Enterprise comes with fully supported and maintained plugins from the Ionic Team. Learn More or if you're interested in an enterprise version of this plugin Contact Us. Supported Platforms. Android. iOS. Windows. Usage. React. LATTICE vibrations in ionic crystals are usually treated with the unretarded Coulomb forces. Despite some discussions in the existing literature1,2, the precise nature of the effect due to retardation remains unknown. We have found that explicit solution of the problem is possible for diatomic crystals with optical isotropy, mainly because the lattice vibrations concerned are very long waves, for which the lattice behaviours can be described by the following equations3: where w is the displacement of the positive ions relative to the negative, multiplied by the square root of the ratio of the. Optical fiber sensors are increasingly used because of the nonelectrical nature of signals. In this paper, the most frequently used vibration optical fiber sensors will be reviewed, classifying them by the sensing techniques and measurement principles. In Figure 1 a general classification of vibration sensors is shown: intensity-based sensors (IBSs) are those in which intensity is modulated by an external parameter; Fabry-Pérot interferometers (FPIs) are passive optical structures that utilize multiple-beam interference in a cavity between two semireflective surfaces. The deformation causes a coupling of the optical

guided modes to higher order radiation modes; these modes are attenuated by the surrounding medium.