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An "abnormal" Raman features of phonons in nano-structures¹ SHU-LIN ZHANG, School of Physics, Peking University and Dept of Phys, Tsinghua University, L. XIA, School of Phys, Peking University, C.X. WANG, Dept of Phys, Tsinghua University, J.Z. JIANG, Dept of MSE, Zhejiang University, H. CHEN, Dept of Phys, Tsinghua University — The Raman features of nanostructures are dependent of their sizes due to the small size effect. This has been confirmed by many observations, for example, the observation on the correlation between the size of Si-, and C- nano-structure and their Raman frequencies. But we also observed strangely that Raman frequencies of single- and multiple- phonons are both independent of the size for the optical modes in polar nano-semiconductors, although all of other phonon frequencies are changed with sample size. The calculation of theoretical Raman spectra, except for exhibiting a similar result, explored that the above phonon feature is due to the long-range Coulomb (Fröhlich) interaction existing in polar nano-semiconductors. We acknowledge the support from National Basic Research Program of China under grants No. 2009CB929403 and the NSF of China under grants Nos. 10774006,60876002.

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