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Emergence of collective plasmon excitation in a confined one-dimensional electron gas ZHE YUAN, Department of Engineering Physics, Chalmers University of Technology, SHIWU GAO — We present a theoretical study of the electronic excitation in a confined one-dimensional electron gas [1], which is utilized to model atomic chains created in recent experiments. The length dependence of the excitation spectra is obtained from the linear response theory within the random phase approximation and time-dependent density functional theory. As the length of the chains increases, the dipole excitation spectra shows a transition from electron-hole pair excitations to collective plasmon excitation. The trend of the length-dependent plasmon resonance is predicted, and the nature of the plasmon resonance is also elaborated.

[1] Shiwu Gao and Zhe Yuan, Phys. Rev. B 72, 121406(R) (2005).

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