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Multipole Excitations of Fullerene Molecules

KRISHNA LAMICHHANE, University of Nevada, Reno, KASHMIR LAMICHHANE, Tribhuvan University, Nepal, MATTHIAS BRACK, University of Rogensberg, Germany, PETER WINKLER, University of Nevada, Reno — Collective properties of quantum systems are always of special interest because they can lead to macroscopic, observable effects. A famous example is the electronic vibrations in metal clusters which give church windows their spectacular appearance. A proven method to study the physics of metal clusters is the local current approximation (LCA). It is a semi-classical method and will be introduced and derived from a general variational principle. Here it is applied to electronic vibrations of the valence electrons of fullerene molecules. The bulk of the valence electrons is treated as a semi-classical fluid that does not only exhibit translational but also compressional vibrations. The coupling of these two modes has been studied and shown to be in good agreement with data from photoionization experiments on C_{60} . The same semi-classical approach has been applied to study the energies of higher angular momentum resonances.

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