

Ground and Excited States of Bipolarons in Two and Three Dimensions

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Abstract: The properties of large bipolarons in two and three dimensions are investigated by averaging over the relative wavefunction of the two electrons and using the Lee-Low-Pines-Huybrechts variational method. The ground-state (GS) and excited-state energies of the Fröhlich bipolaron for the whole range of electron-phonon coupling constants can be obtained. The energies of the first relaxed excited state (RES) and Franck-Condon (FC) excited state of the bipolaron are also calculated. It is found that the first RES energy is lower than the FC state energy. The comparison of our GS and RES energies with those in literature is also given.

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Key words: bipolaron, ground-state energy, excited-state energy, Lee-Low-Pines-Huybrechts variational method

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