EFFECTS OF DOMAIN WALL DYNAMICS IN THE OPTICAL CONDUCTIVITY OF α-NaV_2O_5

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Using finite temperature diagonalization techniques it is shown that the quarter-filled t-J-V model on a trellis lattice structure provides a quantitative explanation of the highly anisotropic optical conductivity of the α-NaV_2O_5 compound. The combined effects of the short-range Coulomb interaction and valence fluctuations of V-ions determine the main absorption and the fundamental gap. Inter-ladder hopping is necessary for the explanation of the anomalous in-gap absorption and generation of spectral weight at high energy. The role of valence fluctuations is explained in terms of the domain wall excitations of an anisotropic 2D Ising model in a transverse field close to criticality.

9.7 cm

13.4 cm

Subject category :

1. Correlated Electrons and High Temperature Superconductors

Presentation mode :
poster

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