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Specific heat of cuprate superconductors[1] P. SALAS, Posgrado en Ciencia e Ingenieria de Materiales, UNAM, M. FORTES, F.J. SEVILLA, M.A. SOLIS, Instituto de Fisica, UNAM — We model cuprate superconductors as a fluid of electrons able to create pairs within an infinite layered structure. The paired electrons (Cooper pairs) coexist with the unpaired electrons in almost two dimensional slabs stacked in their perpendicular direction. Electron pairs are considered as noninteracting zero spin bosons with a linear dispersion relation, and inter-slab penetrable planes are simulated by Kronig-Penney delta potential taken in one dimension, while paired and unpaired electrons are free to move in the other two dimensions. We introduce the slab thickness and the plane "impenetrability", using real parameters of $YBaCuO_{7-x}$ cuprates. Paired electrons develop a boson condensate with a jump in the specific heat at the superconductor critical temperature. After summing the electronic contributions, paired plus unpaired, we obtain a linear behavior of the electronic specific heat over temperature, C_e/T. By adding the lattice specific heat (phonons) C_l, we are able to qualitatively reproduce the total specific heat. We also obtain a theoretical value for the electronic specific heat constant γ_e, which is in agreement with the experimental values reported.

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