Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Bosonic matter inside a periodic array of tubes P. SALAS, UNAM, F.J. SEVILLA, M. FORTES, M.A. SOLIS, Instituto de Fisica, UNAM — We report the Bose-Einstein Condensation critical temperature, internal energy and specific heat per particle of an ideal boson gas in periodically trapping channels. These are simulated by two perpendicular external Kronig-Penney delta potentials applied on the x-y plane and allowing the particles to move freely in the remaining direction. We obtain the Bose-Einstein condensation critical temperature of the system as a function of the separation between deltas and as a function of their intensity which models the penetrability of the tube walls. It is shown that T_c decreases monotonically, from the 3D ideal boson gas T_0 for vanishing delta strenght, down to 0 as the intensity grows to infinity while keeping the channel's cross section constant. The quotient T_c/T_0 as a function of the width of the tubes starts at 1, reaches a minimum value that depends on the permeability and returns to 1 as the widths vary from infinity to 0. We observe that the specific heat as a function of the temperature is modified by the tubular structure, showing a set of maxima and minima for different values of permeability of the walls and widths of the tubes. In particular, when half the wave-length of the boson gas is the same as the tubes' square cross section, the system clearly exhibits the trapping effect due to the tubes. In this case the specific heat has a minimum very similar to that of the one- dimensional case.

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Date submitted: 26 Nov 2010

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