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Boson gas in a periodic array of tubes[1] P. SALAS, Posgrado en Ciencia e Ingenieria de Materiales, UNAM, F.J. SEVILLA, M.A. SOLIS, Instituto de Fisica, UNAM — We report the thermodynamic properties of an ideal boson gas confined in an infinite periodic array of channels modeled by two, mutually perpendicular, Kronig-Penney delta-potentials. The particle's motion is hindered in the x-y directions, allowing tunneling of particles through the walls, while no confinement along the z direction is considered. It is shown that there exists a finite Bose-Einstein condensation (BEC) critical temperature T_c that decreases monotonically from the 3D ideal boson gas (IBG) value T_0 as the strength of confinement P_0 is increased while keeping the channel's cross section, $a_x a_y$ constant. In contrast, T_c is a non-monotonic function of the cross-section area for fixed P_0. In addition to the BEC cusp, the specific heat exhibits a set of maxima and minima. The minimum located at the highest temperature is a clear signal of the confinement effect which occurs when the boson wavelength is twice the cross-section side size. This confinement is amplified when the wall strength is increased until a dimensional crossover from 3D to 1D is produced.

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