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**Bogoliubov Excitations and Superfluidity in a Kronig-Penney Potential**<sup>1</sup> IPPEI DANSHITA, National Institute of Standards and Technology, Gaithersburg, MD 20899, USA, SUSUMU KURIHARA, Department of Physics, Waseda University, Ohkubo, Shinjuku-ku, Tokyo 169-8555, Japan, SHUNJI TSUCHIYA, Dipartimento di Fisica, Universita di Trento, and Istituto Nazionale per la Fisica della Materia, I-38050 Povo, Italy — We study the elementary excitations of Bose-Einstein condensates in a Kronig-Penney potential. We solve the Bogoliubov equations analytically and obtain the band structure of the excitation spectrum. We show that the excitation spectrum is phononlike at low energies. It is found that the anomalous tunneling of low-energy excitations is crucial to the phonon dispersion, which is directly connected to the superfluidity of the condensate.

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