

Diamagnetic currents supported by collective charge waves in a class of Mott insulators

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We put forward a model of tightly bound electrons in a bipartite lattice with repulsive interaction between electrons of same spin located in neighboring sites. Assuming external magnetic field the stationary states are obtained for spin dependent repulsion energy much larger than the hopping coefficient. The expectation value of the canonical momentum, as well as the current density, for these states turn out to be proportional to the vector potential, which proves that the system is a perfect diamagnet. The excitations of the system are collective charge waves and, although the system is an antiferromagnetic insulator in the sense of Bloch theory, coherent transport of charge occurs through these travelling charge waves. © 1995.