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Quantum Phase Transitions in an Ionic Hubbard Model in One Dimension JI-WOO LEE, SUNG MOON KIM, KYO YEON CHO, Myongji University — We study quantum phase transitions in an ionic Hubbard model in one dimension. This model accounts for electrons in alternating potentials with a lattice period of 2. For a specified alternating potential of strength Δ, we change the local repulsion between spin-up and spin-down electrons, U, for the model to exhibit a quantum phase transition from a band insulator to a Mott insulator. Via exact diagonalization with a modified Lanczos method, we find that, as we tune U, the ground-state energy shows a level crossing at half-filling. We obtain a phase diagram of the model by using a finite-size scaling method. Also, we find an interesting feature of double occupancy around the phase transitions.

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