Multiple lattice kinks in a cation lattice

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One peculiarity of the mineral mica muscovite is the presence of dark tracks of magnetite in the cation layer, some due to swift particles and some along the lattice directions due to some kind of lattice excitation called *quodons*. See Ref. [**1**] for a recent review. Recently a model with realistic interactions for the cation layer of the silicate muscovite mica has been developed [**2, 3**], one of their findings was the existence of a supersonic lattice kink also called a *crowdion*. This lattice kink have a constant velocity and a constant energy of 26 eV. This energy was of particular interest because it is smaller that the recoil energy of the beta decay of ^{40}K, which is the probably source of *quodons*, but also larger than the energy to eject an atom from the lattice, which is about 8 eV. as demonstrated experimentally [**4**]. It was observed that only positive particles were able to leave a dark track in the mineral, which led to the conclusion that most of quodons also have a positive charge [**5**]. This property connected with lattice kinks, because they include the transport of an ion of K^+ and therefore of a positive charge, which is produced by the emission of an electron during beta decay.

The lattice kinks have an structure of a double kink or if described in the distances between particles of a double soliton. This is a particular case of bound solitons who have been described and analyzed in previous publications [**6**]. In this article we analyze which other multi-kinks can appear in the realistic model for the cation layer of mica muscovite, we analyze their energies and their possible role in the production of tracks in muscovite mica. We also study which is the role of the three potentials involved: repulsive electrostatic potential, short-range nuclear repulsion and on-site potential produced by the rest of the lattice in the appearance of the different lattice-kinks.

Keywords: mica muscovite, quodons, crowdions, lattice kinks, bound solitons, charge transfer.

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