Pictorial description for LENR in linear defects of a lattice

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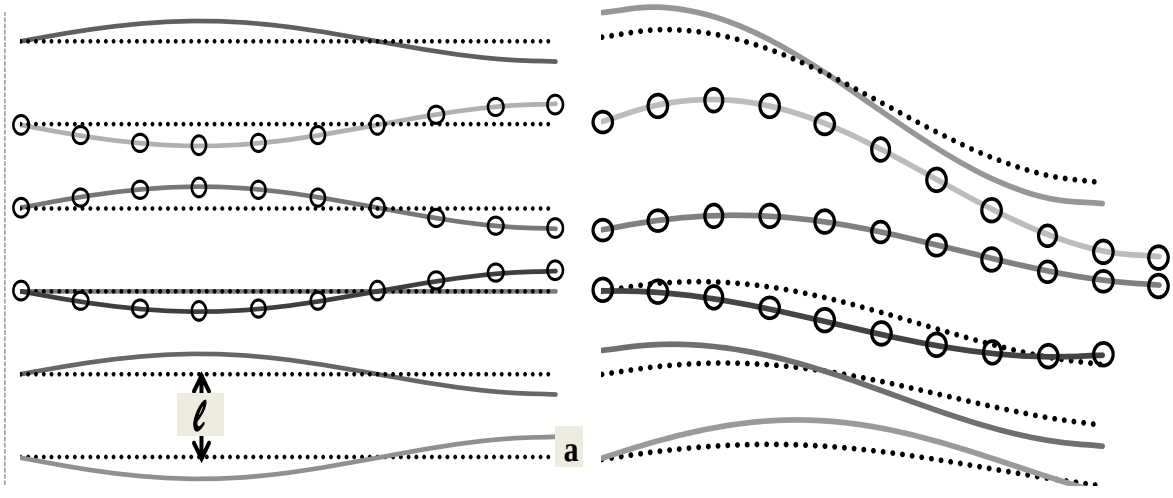
ABSTRACT

The concept of phonons in solid-state physics is based on oscillations of atoms about equilibrium positions within a lattice. These equilibrium positions are usually a fixed distance apart within the lattice and the oscillations are generally a small fraction of that spacing. Under these conditions, the atoms never get closer to one another than ℓ – 2a, where ℓ is the lattice spacing and 'a' is the maximum amplitude of the atomic oscillation. A model for LENR within crevices of a lattice provides a different scenario. This presentation represents the concepts of, the requirements for, and the implications of, the new picture.

The new concept is that the lattice does not tightly bind the sub-lattice within the linear defect. Under certain conditions, the sub-lattice spacing can become independent of the lattice spacing and sections of the sub-lattice will act like an 'accordion' or a 'Slinky'. The group oscillations, represented by different phonon modes, allow ℓ to change. The figures below indicate the importance of this concept. The leftside figure is the conventional longitudinal optical phonon mode with alternating hydrogen atoms coming together within their individual lattice sites. The lattice barrier limits them before they ever encounter the nuclear Coulomb barrier. The dotted lines indicate the equilibrium values of the lattice (ℓ is fixed) that the hydrogen oscillates about. The rightside figure indicates the additional freedom available to a linear array (sub-lattice) that is not confined by the lattice. The sub-lattice spacing is not defined by the lattice barriers (ℓ is <u>not</u> fixed), but the electron and hydrogen motions may still be limited to one or two dimensions by the lattice. Fluctuations of the sub-lattice spacing, added to that of the phonon modes, greatly reduce the minimum distance possible between hydrogen atoms on a cyclic basis. (Notice the near overlap of the circles that represent the hydrogen atomic orbital dimensions that are significantly less than the lattice spacings.) Other implications of several aspects of CF modelling will be described in this same manner to clarify concepts that, when expressed in equations only, are less easily appreciated by experimentalists in the community.



Oscillations of a linear sub-lattice (vertical orientation) over time.