Formation of electron strings in narrow band polar semiconductors

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Erratum: Formation of Electron Strings in Narrow Band Polar Semiconductors
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F. V. Kusmartsev

There is a misprint in the integral $I_N$; see Eq. (8). The corrected form is

$$I_N = \int_{-\pi}^{\pi} \int_{-\pi}^{\pi} \int_{-\pi}^{\pi} \frac{dx \, dy \, dz}{(2\pi)^3} \frac{1}{(3 - \cos x - \cos y - \cos z)} \left( \frac{\sin(Nx/2)}{N \sin x/2} \right)^2.$$  \hspace{1cm} (1)

In the region $10 \leq N \leq 2.0 \times 10^3$ this integral was approximated as $I_N \approx \frac{A}{N\pi}$, with the constants $A \approx 0.9743$ and $\alpha \approx 0.85$. This approximation gives a correct conclusion about the existence of a polaron instability and the consequential formation of electron strings in ionic solids. However, to determine a precise criterion for such an instability a better approximation $I_N \approx 0.45/N + 0.3 \log(N)/N$, which gives the correct asymptotic behavior as $N \to \infty$, must be used. With the use of this approximation for $I_N$ by a minimization of the total energy of the string, including Coulomb and exchange energies, as described in the paper we get the number of particles $M$ trapped into the string (note $M < N$),

$$M \approx \frac{\varepsilon_0 a t}{e^2}.$$  \hspace{1cm} (2)

The criterion for string formation is transformed to the form $c < 8t$, which essentially means that the polaron shift must be smaller than the string bandwidth $2t$. Thus, we reiterate our conclusion that in polar narrow band semiconductors small adiabatic polarons may be unstable; this instability induces the formation of strings which are linear multiparticle objects.

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