Erratum: Formation of Electron Strings in Narrow Band Polar Semiconductors [Phys. Rev. Lett. 84, 530 (2000)]

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

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

In the region $10 \le N \le 2.0\times 10^3$ this integral was approximated as $I_N \approx \frac{A}{N^\alpha}$, 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 $I_N = 0.45/N + 0.3\log(N)/N$, 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 $M < N$),

$$M \approx \frac{\epsilon_0 a t}{e^2}. \tag{2}$$

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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