

Binding, Stability, and Non-binding of multi-polaron systems

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A polaron is an electron surrounded by the electric field it generates by polarizing the surrounding atoms of an ionic crystal. It is both a physical model in condensed matter physics and a simple model of non-relativistic quantum field theory. We shall be concerned with the ground state energy of many polarons, i.e., many electrons, and whether there is binding and stability. The answer depends on the electron Coulomb repulsion parameter U and the coupling constant to the field, α . In recent work with R. Frank, R. Seiringer and L. Thomas we have proved that there is stability of matter if $U > \alpha$ (this is sharp), and there is no binding of any kind if $U > U_c(\alpha)$, independent of electron number, N . See arXiv:1004.1196 and arXiv:1004.4892.