1057-81-353 **Rupert Frank**, **Elliott Lieb**, **Robert Seiringer** and **Lawrence E. Thomas***
(let@virginia.edu), Mathematics Department, Kerchof Hall, University of Virginia, Charlottesville, VA 22904. *Remarks on the ground state energy for the N-particle polaron system.* Preliminary report.

The N-polaron Hamiltonian describes N electrons interacting with a quantized phonon field and with each other via Coulomb repulsion. In their paper *Bounds on the minimal energy of translation invariant N-polaron systems* (to appear in Commun.Math.Phys.), M. Griesemer and J. S. Møller provided upper and lower bounds on the ground state energy for this Hamiltonian. These bounds show a phase transition in the the ground state energy $N \to \infty$ as a function of the relative strengths of the electron-phonon coupling constant and the electron charge: for small repulsion, the ground state energy behaves as $\propto -CN^{7/3}$, whereas for sufficiently strong repulsion the energy is bounded below by $-CN^2$. We review key inequalities employed in their analysis, including a commutator estimate controlling the ultraviolet modes of the phonon field, and present new inequalities for the ground state energy in the restricted situation in which the phonon field is supported on proper subsets of R^3. (Received January 25, 2010)