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Quantum mechanical models of energy dependence on fractional charge¹ STEVEN VALONE, Materials Science and Technology Division, Los Alamos National Laboratory, SUSAN ATLAS, Department of Physics and Astronomy, University of New Mexico — When subsystems interact sufficiently, the subsystems can exchange electrons and the effective number of electrons on each subsystem can take on fractional values. The energy of the system can be expressed as a function of that fractional charge. Pioneering work of Perdew, Parr, Levy, and Balduz [1] showed that when the subsystems interact weakly, the energy depends linearly with the fractional charge. We explain recently derived energy dependencies, based on a 2-state model, for the case when the subsystems interact strongly [2]. Those results are extended to a more general 3-state case. Insights into the properties of the chemical potentials of the subsystems are discussed.

[1] J. P. Perdew, R. G. Parr, M. Levy, and J. L. Balduz, Jr., *Phys. Rev. Lett.* **49**, 1691 (1982).

[2] S. M. Valone and S. R. Atlas, *Phys. Rev. Lett.* accepted.

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