Some Comments on Regularized Classical Coulomb Potentials WAYNE BOMSTAD, APARNA BASKARAN, JOHN KLAUDER, JAMES DUFTY, University of Florida — A classical statistical mechanics for electron – proton charge neutral systems does not exist, due to the singular attractive Coulomb interaction at short distances. This problem is removed in quantum theory due to diffraction effects. A classical theory is restored using regularized Coulomb interactions incorporating these effects which are finite at short distances. Regularized Coulomb interactions can be constructed by an exact mapping of the quantum pair distribution function onto the corresponding classical function. Approximate evaluations of this mapping by variational and perturbation methods are critiqued, with suggestions for improvement.

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