Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Correlation-Kinetic Contributions in the Mapping to Model Non-interacting Fermion and Boson Systems XIAOYIN PAN[1], Ningbo University, VIRAHT SAHNI, The Graduate Center CUNY — In the mapping from a system of electrons in an external field $\vec{\mathcal{F}}^{ext} = -\nabla v(\vec{r})$ to one of noninteracting fermions or bosons in their ground state with equivalent density $\rho(\vec{r})$, electron correlations due to the Pauli principle, Coulomb repulsion, and Correlation-Kinetic effects must be accounted for. Via Quantal Density Functional Theory[†] (QDFT), it is proved that the contributions due to the Pauli principle and Coulomb repulsion to either mapping are the same. The application to atoms of the QDFT mapping to the model fermion system shows the Correlation-Kinetic energy contribution to be a very small fraction of the electron-interaction energy. In contrast, the same application of the QDFT mapping to the model boson system shows the corresponding Correlation-Kinetic energy to be a substantial fraction of the electron-interaction energy. Thus, whereas Correlation-Kinetic effects are insignificant in the mapping to the fermionic system, they play a significant role in the mapping to the model system of bosons.
[†]Quantal Density Functional Theory, Springer-Verlag, 2004

[1]Supported by National Natural Science Foundation, China. Grant 10805029

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Date submitted: 21 Nov 2008 Electronic form version 1.4