Abstract Submitted
for the HAW05 Meeting of
The American Physical Society

Fully self-consistent HF-based RPA calculations for giant resonances in nuclei SHALOM SHLOMO, Texas A&M University — The study of collective modes in nuclei provides important information on the structure and bulk properties of nuclear systems. In particular, the excitation energies of compression modes and of isovector modes in nuclei are sensitive to the values of the symmetric nuclear matter incompressibility coefficient K and the symmetry energy coefficient J, respectively. Accurate knowledge of the values of K and J is very important in the study of properties of nuclei, heavy ion collisions, neutron stars and supernova. Hartree Fock (HF)-based random phase approximation (RPA) theory is very successful in providing microscopic description of giant resonances. However, although not always stated in the literature, self-consistency is violated in actual implementation of the RPA calculations. We will present results of highly accurate calculations of the consequences of self-consistency violations (SCV) on the values of the centroid energies E of isoscalar and isovector modes and show that the effects of SCV on E are larger than the current experimental uncertainties. We also point out that the effects of SCV on the centroid energy of the isoscalar giant monopole resonance (breathing mode) may lead to a discrepancy as large as 20% in the extracted value of K.

Shalom Shlomo
Texas A&M University

Date submitted: 31 May 2005 Electronic form version 1.4