Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

A DMRG approach to impurities and interactions in carbon nanotubes ALEXANDER STRUCK, University of Kaiserslautern, SEBASTIAN REYES, University of Kaiserslautern and Pontificia Universidad Catolica de Chile, SEBASTIAN EGGERT, University of Kaiserslautern — Carbon nanotubes (CNTs) are well suited to study strong electronic correlations in quasi-one-dimensional systems experimentally and theoretically. Of particular interest is the interplay of interactions between the conducting electrons and impurities in the nanotube. Impurities include the boundaries of short tubes as well as structural imperfections such as the Stone-Wales lattice distortion. Interactions can lead to different phases of the electron liquid, depending on their range and strength, and can produce quasi-localized ground states of e.g. the Mott insulator type or a charge density wave. Here we discuss a systematic approach using the density-matrix renormalization group (DMRG) method to treat a recently derived lattice model for a single-wall armchair CNT with short-range interactions and a Stone-Wales impurity. We show interaction driven modifications to the expected density patterns that can lead to anomalous Friedel oscillations around the impurity.

Alexander Struck
University of Kaiserslautern

Date submitted: 21 Nov 2008 Electronic form version 1.4