Low-energy local density of states of the 1D Hubbard model SE-
BASTIAN EGGERT, STEFAN SOEFFING, University of Kaiserslautern, IMKE
SCHNEIDER, Technical University of Dresden — We examine the local density of
states (DOS) at low energies numerically and analytically for the Hubbard model in
one dimension. The eigenstates represent separate spin and charge excitations with
a remarkably rich structure of the local DOS in space and energy. The results pre-
dict signatures of strongly correlated excitations in the tunneling probability along
finite quantum wires, such as carbon nanotubes, atomic chains or semiconductor
wires in scanning tunneling spectroscopy (STS) experiments. However, the detailed
signatures can only be partly explained by standard Luttinger liquid theory. In
particular, we find that the effective boundary exponent can be negative in finite
wires, which leads to an increase of the local DOS near the edges in contrast to the
established behavior in the thermodynamic limit.

Sebastian Eggert
University of Kaiserslautern