Abstract Submitted for the MAR06 Meeting of The American Physical Society

Thermal transport of dimerized and frustrated spin-1/2 chains¹ FABIAN HEIDRICH-MEISNER, Department of Physics and Astronomy, The University of Tennessee, Knoxville, and Condensed Matter Sciences Division, Oak Ridge National Laboratory, ANDREAS HONECKER, WOLFRAM BRENIG, Institut für Theoretische Physik, Technische Universität Carolo-Wilhelmina zu Braunschweig, Germany — We present a numerical study of thermal transport in dimerized and frustrated spin-1/2 chains at finite temperatures. Since these models are nonintegrable, the thermal Drude weight scales to zero in the thermodynamic limit. The conductivity at finite frequencies, however, is non-zero and we discuss the scaling with system size as well as the extrapolation to the zero-frequency limit. Results for three cases are presented. First, the dimerized chain is studied in the limit of weakly coupled dimers. In this case, interactions of the elementary triplet excitations are weak, which should allow for an analytical description based on a bond-boson operator representation. Second, we compare the thermal conductivity of the frustrated chain in the massless and the massive regime of this model. Finally, we extract the zero-frequency thermal conductivity of the isotropic two-leg spin ladder and discuss implications for the interpretation of recent experiments for $La_5Ca_9Cu_{24}O_{41}$.

¹This work was supported by the Deutsche Forschungsgemeinschaft, DFG.

Fabian Heidrich-Meisner UT Knoxville and ORNL

Date submitted: 30 Nov 2005

Electronic form version 1.4