

# Quantum Monte Carlo Investigation of Quantum Phase Transitions of Mixed Heisenberg Spin Chains

Rainer Bischof  
Universität Leipzig, Germany

By means of quantum Monte Carlo simulations at low temperatures, the quantum phase transitions in antiferromagnetic Heisenberg spin chains consisting of two different kinds of spin,  $S_a$  and  $S_b$ , that appear alternately in pairs, are investigated for the cases  $S_a = 1/2$  and  $S_b = 1$ ,  $S_a = 1/2$  and  $S_b = 3/2$  as well as  $S_a = 1$  and  $S_b = 3/2$ . Transitions between qualitatively different ground states (quantum phases) are induced by varying the parameter  $\alpha$  which is the relative coupling between unlike and like spins. In particular, the so-called twist order parameter as well as spatial and imaginary temporal correlation lengths are measured and analysed. Critical values of  $\alpha$ , critical exponents are extracted by finite-size scaling analysis.