

## Quantum spin-1/2 $XX$ model on a distorted diamond chain and Jordan-Wigner fermionization

T. Verkholyak<sup>a</sup>, J. Strečka<sup>b</sup> and M. Jaščur<sup>b</sup>

<sup>a</sup>*Institute for Condensed Matter Physics of the National Academy of Sciences of Ukraine, 1 Svientsitskii Str., 79011 Lviv, Ukraine*

<sup>b</sup>*Department of Theoretical Physics and Astrophysics, Institute of Physics, P. J. Šafárik University, Park Angelinum 9, 040 01 Košice, Slovak Republic*

We consider magnetic properties of the quantum spin-1/2  $XX$  model on a distorted diamond chain. The investigated system represents the model with frustrating interaction and may be related to several magnetic compounds such as azurite. We perform the Jordan-Wigner transformation to get the model in terms of spinless fermions. In contrast to the simple spin-1/2  $XX$  chain with the nearest-neighbor interaction, some  $XX$  couplings are mapped to four-fermion terms which introduce the fermion interaction into the model. The interaction terms are considered perturbatively within the Hartree-Fock approximation. Using this method, we calculate the ground state and thermodynamic functions of the model and compare results with the available exact ones for some particular cases as well as with the results of numerical approaches.