1126-17-307 **Evgeny Mukhin**, **Vitaly Tarasov*** (vtarasov@iupui.edu) and **Alexander Varchenko**. *Bethe ansatz for the isotropic Heisenberg spin chain and more.*

The Heisenberg chain (XXX model) is a quantum system with the Hamiltonian $H = \sum_{a=1}^{n} P_{a,a+1}$ acting on $(\mathbb{C}^2)^{\otimes n}$, where P_{ab} is the swap of the a-th and b-th factors of $(\mathbb{C}^2)^{\otimes n}$ modulo n. H can be included into a family of commuting operators called the transfer-matrix. The Bethe ansatz is a method going back to H. Bethe (1931) to find eigenvectors and eigenvalues of the transfer-matrix. It assigns an (expected) eigenvector of the transfer-matrix to any solution of the system $(t_j+1)^n \prod_{k=1}^{m}(t_j - t_k - 1) = -t_j^n \prod_{k=1}^{m}(t_j - t_k + 1)\,, \quad j = 1, \dots, m$, with no zero factors and distinct $t_1, \dots, t_m$. However, this system fails to have enough solutions of this kind to produce all eigenvectors of the transfer-matrix, and should be modified. I will describe the required modification for the XXX model and related quantum integrable systems, including recent progress for the higher spin version of the XXX model. (Received January 17, 2017)