武汉物数所理论交叉学术交流系列报告
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Thermodynamics, contact and density profiles of the repulsive Gaudin-Yang model

Prof. Andreas Klümper，Wuppertal University
2016年9月20日(周二) 上午10:00–11:30
频标楼4楼报告厅

Lectures：上午10:00，频标楼4楼报告厅
2016年9月19日(周一) Thermodynamic Bethe Ansatz
2016年9月21日(周三) Qauntum tramsfer matrix method
2016年9月22日(周四) T–Y systems
2016年9月23日(周五) Two–component Bosons

About the speaker：

Andreas Klümper 是德国伍珀塔尔大学物理系教授，在量子可积模型、强关联系统、自旋系统、量子无序系统等方向有着丰富的研究成果。他是 quantum transfer matrix 方法的创始人之一。在知名国际刊物《Phys. Rev. Lett.》等上面发表文章100余篇。

Abstract:

We address the problem of computing the thermodynamic properties of the repulsive one-dimensional two-component Fermi gas with contact interaction (Gaudin-Yang model). We derive an exact system of only two non-linear integral equations for the thermodynamics of the homogeneous model. This system allows for an easy and extremely accurate calculation of thermodynamic properties circumventing the difficulties associated with the truncation of the thermodynamic Bethe ansatz system of equations. We present extensive results for the densities, polarization, magnetic susceptibility, specific heat, interaction energy, Tan contact and local correlation function of opposite spins. Our results show that at low and intermediate temperatures the experimentally accessible contact is a non-monotonic function of the coupling strength. As a function of the temperature the contact presents a pronounced local minimum in the Tonks-Girardeau regime which signals an abrupt change of the momentum distribution in a small interval of temperature. The density profiles of the system in the presence of a harmonic trapping potential are computed using the exact solution of the homogeneous model coupled with the local density approximation. At finite temperature the density profile presents a double shell structure (partially polarized centre and fully polarized wings) only when the polarization in the center of the trap is above a critical value.

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