

The efficiency of methodological detours: From vertex models to multi-component quantum gases

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The aim of this talk is two-fold. In the first part I want to explain how the study of interacting quantum gases in the continuum benefits from tools developed for quantum systems on the lattice, and how these tools appeared in the study of classical systems of the type of vertex models. These developments were carried out or were initiated by the many research activities of Prof. J. Zittartz especially in the late 80s and the 90s. In passing I want to point out how matrix-product and tensor-network states evolved in this environment and where the early exact and variational treatments led to. In the second part I will investigate the thermodynamics of the two-component one-dimensional Bose gas with contact interactions in the vicinity of the quantum critical point separating the vacuum and the ferromagnetic liquid regime. The quantum critical region is found to belong to the universality class of the spin-degenerate impenetrable particle gas which, surprisingly, is very different from the single-component case.

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