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JOHANNES GUTENBERG
UNIVERSITÄT MAINZ

JG|U

Quantengravitation-Seminar

June 21, 2012 at 10 a.m. c.t.
Sozialraum der THEP; Institut für Physik (05-427)

Christian Schilling
ETH Zürich

The Fermionic Quantum Marginal Problem and its Physical Relevance

The problem of determining and describing the family of 1-particle reduced density operators (1-RDO) arising from N-fermion pure states (via partial trace) is known as the fermionic quantum marginal problem. We present the basic ideas of its solution which amounts to a finite family of linear inequalities in the eigenvalues of the 1-RDO. We explain why these necessary and sufficient conditions forming a polytop in the euclidean space of all spectra may play the role of kinematical constraints on the time evolution of fermionic quantum systems. To explore the relevance of this effect we study an analytically solvable model. By determining the spectral `trajectory' corresponding to the ground state as function of the fermion-fermion interaction strength we show that these constraints are quasi-tight in the weak-interaction regime and thus play an important role in understanding fermionic systems on the level of 1-RDO.

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