The Abdus Salam International Centre for Theoretical Physics

MECO38
38th Conference of the Middle European Cooperation in Statistical Physics
25 - 27 March 2013, ICTP, Trieste, Italy

STATISTICS OF ENTANGLEMENT PRODUCTION IN A CHAOTIC DOT WITH NON-IDEAL CONTACTS

Pierpaolo VIVO
Univ. XI Paris Sud, LPTMS
F-91405 Orsay Cedex 05, France

Abstract:

We compute analytically the joint distribution of concurrence and norm of the entangled state for the production of electronic entanglement in a chaotic quantum dot. The dot is connected to the external world via two leads, one of which is assumed to be ideal while the other is partially transparent. While previous works could address the issue only by means of numerical simulations, our analytical predictions stem from the recent calculation [P. Vidal and E. Kanzieper, Phys. Rev. Lett. 108, 206806 (2012)] of the joint distribution of transmission eigenvalues in non-ideal cavities for the case of broken time-reversal symmetry. The analytical results are valid for any value of the opacity parameter \gamma of the non-ideal lead. Geometrical constraints valid for the ideal case are shown to hold also in the non-ideal setting: this implies that highly entangled states are less likely to be detected. However, the average concurrence of a state with a prescribed norm N_0 is shown to display a maximum for a non-trivial value of \gamma, that we denote \gamma^\star(N_0). In turn, this optimal opacity has a curious dependence on N_0 and decreases to zero for a special value N_0^\star, in a seemingly discontinuous manner.

Reference: D. Villamaina and P. Vivo, [**arXiv:1207.4623**]