

Andreas Winter (Department of Mathematics, University of Bristol, UK)
High dimensional geometry in quantum information

Abstract: In this talk I will review some recent dramatic progress in quantum information theory - all of the findings discussed rely on methods of geometric measure concentration. In the simplest form this is Levy's Lemma, which states that every not too much fluctuating function on a high-dimensional sphere is almost constant almost everywhere.

This geometric observation has consequences for the existence of good (random) quantum error correcting codes, it enters into the existence of exotic entangled yet highly mixed states (which themselves are applicable in quantum cryptography), and it allows the construction of highly counter-intuitive quantum channels with properties that range from applications to serving as counterexamples to widely held so-called "additivity conjectures". The talk will mostly concentrate on the latter problem, and the recent (2007) construction.