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*Closed formula for the relative entropy of entanglement*

A quantum state (positive semi-definite matrix) acting on a tensor product of two Hilbert spaces, is called a product state if it can be written as a tensor product of two quantum states. A separable state is a convex combination of product states, that describes a composite physical system with no quantum entanglement. Entanglement of a non-separable (i.e. entangled) quantum state is measured by the relative entropy "distance" of the state to the convex set of separable states. This distance is therefore called the relative entropy of entanglement (REE). Since it is NP hard to determine whether a quantum state is separable or not, the convex optimization problem posed by the REE can not be solved analytically. However, in this talk, I will show that a closed formula exists for the inverse problem. That is, for a quantum state on the boundary of the set of separable states, there is a closed formula for all the entangled state for which this state is the closest separable state (CSS). In addition I will show that if an entangled state is full rank, then its CSS is unique. My talk is based on a joint work with Shmuel Friedland.