

There are many more positive maps than completely positive maps

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A linear map Φ between matrix spaces is positive if it maps positive semidefinite matrices to positive semidefinite ones, and is called completely positive if all its ampliations $I_n \otimes \Phi$ are positive. We establish quantitative bounds on the fraction of positive maps that are completely positive. A main tool is the real algebraic geometry techniques developed by Blekherman to study the gap between positive polynomials and sums of squares. We also develop an algorithm to produce positive maps which are not completely positive.

This is a joint work with IGOR KLEP (The University of Auckland), SCOTT MCCULLOUGH (University of Florida) and KLEMEN ŠIVIC (University of Ljubljana).