Diagonal unitary covariant quantum channels

Satvik Singh
University of Cambridge

The talk will present a study of (finite-dimensional) quantum channels which are covariant under the action of the diagonal unitary group. Many salient examples, such as the depolarizing channels, dephasing channels, amplitude damping channels, and mixtures thereof, lie in this class. The first part of the talk will be devoted to the study of entanglement properties of these channels. In particular, by reformulating the entanglement-breaking property of such channels in terms of the cone of pairwise completely positive matrices, I will show that the well-known PPT-squared conjecture holds for channels in this class. I will also unravel an interesting connection between the entanglement-breaking property of such channels and triangle-free graphs. The second half of the talk will deal with the ergodic properties of these channels. I will show that the ergodic behaviour of a channel in this class is essentially governed by a classical stochastic matrix, thus allowing us to exploit tools from classical ergodic theory to study quantum ergodicity of such channels.