ZBIGNIEW PUCHALA, Institute of Theoretical and Applied Informatics, Polish Academy of Sciences

Asymptotic properties of random quantum channels

We consider random quantum channels, especially the limiting behaviour of the diamond norm for two independent random quantum operations. In order to define random channels we use the Choi-Jamiołkowski isomorphism and consider Wishart matrices with normalized partial trace. Next, we derive an asymptotic behaviour of empirical eigenvalue distribution for this ensemble and, using free probability theory, we derive the eigenvalue distribution for the difference of two random Choi-Jamiołkowski matrices. We show the concentration of measure occurs for the diamond norm. In the case of flat measure on random channels, the limiting value of the diamond norm is equal to $\frac{1}{2} + \frac{2}{\pi}$.