



INDIAN STATISTICAL INSTITUTE

Theoretical Statistics and Mathematics Unit, Kolkata

SEMINAR

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VENUE:

L-infinity

(5th Floor, A.N. Kolmogorov Bhavan), ISI Kolkata

TITLE:

Nice Error Basis, Quantum Channel and Semigroups of Various Positive Maps

SPEAKER:

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ABSTRACT:

A nice error basis on $M_n(\mathbb{C})$ is a generalisation of Pauli matrices which form an orthonormal basis of $M_2(\mathbb{C})$ with respect to the Hilbert-Schmidt inner product and is very important for quantum error correction. Exploiting the isomorphisms between $M_n(\mathbb{C}) \otimes M_n(\mathbb{C})$, $\text{Lin}(M_n(\mathbb{C}))$ (the space of linear maps on $M_n(\mathbb{C})$) and $M_{\{n^2\}}(\mathbb{C})$, these unitary error bases can be used to get a suitable discrete Fourier expansion of a linear map $T \in \text{Lin}(M_n(\mathbb{C}))$. This collection of discrete Fourier coefficients considered as a unique $n^2 \times n^2$ matrix, will be utilised to characterise different positivity properties of the map T . More precisely, we will characterise positive, completely (co)positive maps on $M_n(\mathbb{C})$ and entanglement breaking channel for qubit map with respect to such coefficient matrices. Furthermore, we will prove a Schoenberg type correspondence for the non-unital one parameter semigroup of operators to characterise the one-parameter semigroup of k -(super)positive maps in terms of its generator and eventually re-establish the Lindblad, Gorini, Sudarshan, Kossakowski's famous theorem on the structure of the generators of one-parameter semigroup of completely positive maps, which is crucial for studying the dynamics of open quantum system.

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