



INDIAN STATISTICAL INSTITUTE

Theoretical Statistics and Mathematics Unit, Kolkata

SEMINAR

Date: July 12, 2023, Wednesday

Time: 04:15 PM

VENUE:

L-infinity

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

TITLE:

(Equivariant) lifting problem for completely positive maps

SPEAKER:

Suvrajit Bhattacharjee

Dept. of Mathematics, University of Oslo, Norway

ABSTRACT:

Abstract: Let A and B be two C^* -algebras and J be a closed two-sided ideal in B . Let us write $q : B \rightarrow B/J$ for the quotient map and consider the diagram

$$\begin{array}{ccc} & & B \\ & \nearrow \theta & \downarrow q \\ A & \xrightarrow{\phi} & B/J \end{array} ,$$

where ϕ and θ are completely positive, contractive maps. The lifting problem for ϕ asks whether one can find θ so that the diagram commutes. In 1976, Choi and Effros proved that if A is separable and if ϕ is a nuclear map, then the lifting problem for ϕ can be solved. Nowadays referred to as the Choi-Effros lifting theorem, it has found significant applications, most notably in proving that the BDF $\text{Ext}(X)$ is a group, for a compact, metrizable space X , or more generally, the Kasparov $\text{Ext}(A, B)$ is a group, if A is nuclear. The purpose of the talk is to discuss this theorem and its various extensions, to $C_0(X)$ -algebras by Kasparov and Skandalis, to dynamical systems, under a group action, by Forough, Gardella, and Thomsen and under a groupoid action by Forough and the speaker (ongoing), in some detail. We will present the key features of the proof by Arveson, highlighting the very important concept of a quasi-central approximate unit. The equivariant case presents some additional difficulties and the key concept here is that of a quasi-invariant, quasi-central approximate unit used by Kasparov in his proof of his technical theorem. We will try to be as self-contained as possible and will assume little to nothing in terms of background.

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