COLLOQUIUM

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On inductive limit spectral triples

Mathematics and Statistics

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Abstract: In Alain Connes' noncommutative geometry, the geometric information carried by a C^*-algebra A is deciphered through conversion in spectral information, a process that is obtained with the help of a Dirac-type operator D that acts on the Hilbert space $\mathcal{H}$ on which the given algebra is represented. The constituent objects A, $\mathcal{H}$ and D of this process define the notion of spectral triple.

In the literature, one can find several examples of spectral triples $(A, \mathcal{H}, D)$ that are built on inductive limit C^*-algebras $A = \varinjlim A_j$ in such a way that their Hilbert spaces $\mathcal{H}$ and Dirac operators D can also be realized as inductive limits of Hilbert spaces $\mathcal{H} = \varinjlim \mathcal{H}_j$, respectively of selfadjoint operators $D = \varinjlim D_j$. Moreover, the connecting maps that occur in all these inductive limit constructions are compatible in a natural way, making the systems of spectral triples $\{(A_j, \mathcal{H}_j, D_j)\}_j$ into inductive systems.

Our purpose, in this presentation, is to discuss several necessary and sufficient conditions under which the triple $(\varinjlim A_j, \varinjlim H_j, \varinjlim D_j)$ associated with an inductive system of spectral triples $\{(A_j, \mathcal{H}_j, D_j)\}_j$ is also a spectral triple. We also analyze and describe some classical examples of spectral triples in terms of these conditions.

This is joint work with Asghar Ghorbanpour.

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