Dynamical Systems on Spectral Metric Spaces

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Abstract

Spectral triple is the fundamental object of the metric aspects of Connes’ noncommutative geometry. A spectral metric space is a spectral triple \((A, H, D)\) with additional properties guaranteeing that the Connes metric on the state space of \(A\) induces the weak*-topology. It is, in fact, the noncommutative analog of a complete metric space. Assuming that \((A, H, D)\) defines a spectral metric space and \(G\) is a group of automorphisms of \(A\), we will address the problem of whether there is a natural spectral triple for the crossed product algebra \(C^*(G, A)\) that can characterize the metric properties of the dynamical system \((G, A)\). We will introduce a solution to this problem when a single automorphism of \(A\) generates \(G\) as an equicontinuous family of quasi-isometries. We will also address the converse problem, namely, when a spectral metric space for the crossed product gives rise to one for \(A\). This talk is based on a joint work with Jean Bellissard and Matilde Marcolli.