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Duality for Amenability of Coideals of Quantum Groups

Coideals are special dynamical objects that are a quantization of homogenous spaces from classical groups to quantum groups. They offer a noncommutative analogue of a subgroup with the caveat that there may exist no underlying quantum group serving as a 'subgroup'. Just like with groups, and more generally quantum groups, there is a Fourier transform for coideals and hence a corresponding Pontryagin duality. An important thing to be able to do is transfer algebra-analytical properties across this Pontryagin duality. In the more general context of quantum group actions on von Neumann algebras (vNas), a vehicle for transferring properties across Pontryagin duality is the crossed product. Here a result comes in the form of having a certain property of a vNA action of a quantum group \mathbb{G} characterized by the another certain property of the induced action of its dual $\hat{\mathbb{G}}$ on the crossed product of the given vNA. Much progress along these lines, especially for coideals, has been achieved in the past few years by the likes of researchers including (and not limited to) myself, Khosravi, Moakhar, De Ro, and Hataishi. In this talk I will discuss a result along these lines for certain (co)amenability properties of coideals and their so-called (co)duals and, in particular, the involvement of crossed products and their role in duality. I will also present, as an application, the resolution of certain operator algebraic problems regarding the reduced C^* -algebras of quantum groups and boundary theory. I will be discussing a joint work with Fatemeh Khosravi.