Title: Weak multiplier Hopf algebras

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Abstract:

For any finite groupoid G, the algebra $K(G)$ of complex functions on G (with pointwise operations) is a (finite-dimensional) weak Hopf algebra for the coproduct Δ on $K(G)$ defined as usual by $\Delta(f)(p,q) = f(pq)$ when $p, q \in G$ and when pq is defined, and by $\Delta(f)(p,q) = 0$ if pq is not defined. If the groupoid G is no longer assumed to be finite, this result is no longer true. However, if we then take for $K(G)$ the algebra of complex functions with finite support on G (again with pointwise operations), then Δ defined as above makes of the pair $(K(G), \Delta)$ a *weak multiplier Hopf algebra* with integrals.

In this talk, I will first explain the notion of a weak multiplier Hopf algebra and discuss the relation with the known concept of a weak Hopf algebra. It is no longer assumed that the underlying algebra has an identity and it follows that one has to consider coproducts that map into the multiplier algebra of the tensor product $K(G) \otimes K(G)$ of $K(G)$ with itself. Even more than in the case of multiplier Hopf algebras, this implies essential differences.

In the second part of the talk, I will discuss the case where the weak multiplier Hopf algebra has integrals. Then it is possible to construct a dual, just as in the case of finite-dimensional weak Hopf algebras. The construction is similar as in the case of multiplier Hopf algebras with integrals. We call such a weak multiplier Hopf algebra an *algebraic quantum groupoid*. In the involutive case, and when the integrals are positive, it is expected to get a measured quantum groupoid as studied by Enock, Lesieur and others.

This is about work in progress with Shuanhong Wang (Southeast University of Nanjing - China), Thomas Timmermann (University of Münster - Germany) and Byung-Jay Kahng (Canisius College Buffalo - USA).

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