Compact principal bundles as Galois-type extensions

Piotr M. Hajac

The main result is that the freeness of actions of compact quantum groups on unital C*-algebras, or more generally, the principality of comodule algebras, is preserved under one-surjective pullbacks (fibre products). We algebraize the C*-setting by defining for any compact quantum group action on a unital C*-algebra its Peter-Weyl comodule algebra. Thus we extend the notion of the algebra of regular functions (spanned by the matrix coefficients of the irreducible unitary corepresentations) from compact quantum groups to unital C*-algebras on which they act. This talk will be focused on deducing the equivalence of the freeness of a classical compact group action on a compact Hausdorff space and the Galois condition for its Peter-Weyl comodule algebra. In this way, the well-known analogy between coverings and Galois extensions is made precise and generalized from finite to all compact groups. Time permitting, there will be entertainment part explainig how all the above is linked with the the celebrated Dedekind problem of determining the number of elements in a free distributive lattice generated by N elements. The problem remains open since 1897. (Based on joint work with P.F.Baum, U.Kraehmer, R.Matthes, E.Wagner and B.Zielinski.)