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Peak Functions and Eulerian Enumeration

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In 1995 the complete duality of Q – the Hopf algebra of quasisymmetric functions – and NC – the Hopf algebra of nonommutative symmetric functions – was realised by Malvenuto and Reutenauer. Since then a natural question to ask is: Given a Hopf subalgebra of Q, can the dual quotient Hopf algebra in NC be found?

One instance of success has been in finding the dual of the peak algebra of Stembridge. In this talk we will introduce the above Hopf algebras and the dual to the peak algebra, and relate this duality to the cd-index often studied by geometers.

This is joint work with N. Bergeron, S. Mykytiuk, F. Sottile, and L. Billera and S. Hsiao.