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Quantum algebras, shuffle algebras and Hall algebras

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Abstract. The Hall algebra of coherent sheaves on a genus g curve over F_q is an important object in geometric representation theory: when $g = 0$ it gives rise to the positive half of $U_q(\mathfrak{sl}_2)$, while its $g = 1$ case (known as the elliptic Hall algebra) has recently found numerous applications, ranging from the study of categorical knot invariants to the study of derived categories of Hilbert schemes of surfaces. In the present talk, I will review a program that realizes the genus g Hall algebra as a quantum loop algebra, using shuffle algebra techniques. Based on joint work with Francesco Sala, Olivier Schiffmann and Alexander Tsymbaliuk.