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Stokes phenomena, quantum groups and Poisson-Lie groups

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Quantum groups have long been known to be related to Conformal Field Theory through the Knizhnik-Zamolodchikov (KZ) equations. This Betti role as natural receptacles of monodromy has been significantly expanded in recent years by including the Casimir equations which are dual to the KZ ones. This has led to a novel construction of quantum groups from the dynamical KZ (DKZ) equations. Unlike their precursors, these have irregular singularities and therefore exhibit Stokes phenomena which describe the discontinuous change of asymptotic of solutions near singular points. In particular, the Stokes matrices of the simplest DKZ equations are R-matrices of the corresponding quantum group.

In a parallel development, Boalch constructed the Poisson structure on the dual G^* of a complex reductive group G by using Stokes phenomena for the simplest irregular connection on the trivial G-bundle over $\mathbb{P}^1$. This transcendental linearization of G^* is particularly tantalizing in that it is very close in spirit to the above construction of quantum groups.

I will explain how quantum groups arise from the dynamical KZ equations, describe Boalch's construction, and obtain a precise link between these two uses of Stokes phenomena, by showing that the latter construction can be obtained as a semiclassical limit of the former.

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