F. Gavarini, *"Poisson geometrical symmetries associated to non-commutative formal diffeomorphisms"*

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ABSTRACT

Let $\mathcal{G}^{\mathrm{dif}}$ be the group of all formal power series starting with x with coefficients in a field $\Bbbk$ of zero characteristic (with the composition product), and let $F\big[\mathcal{G}^{\mathrm{dif}}\big]$ be its function algebra. In [BF] a non-commutative, non-cocommutative graded Hopf algebra $\mathcal{H}^{\mathrm{dif}}$ was introduced via a direct process of "disabelianisation" of $F\big[\mathcal{G}^{\mathrm{dif}}\big]$, taking the like presentation of the latter as an algebra but dropping the commutativity constraint. In this paper we apply a general method to provide four one-parameters deformations of $\mathcal{H}^{\mathrm{dif}}$, which are quantum groups whose semiclassical limits are Poisson geometrical symmetries such as Poisson groups or Lie bialgebras, namely two quantum function algebras and two quantum universal enveloping algebras. In particular the two Poisson groups are extensions of $\mathcal{G}^{\mathrm{dif}}$, isomorphic as proalgebraic Poisson varieties but not as proalgebraic groups.

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References

[BF] C. Brouder, A. Frabetti, *Noncommutative renormalization for massless QED*, preprint hep-th/0011161 (2000).

[Ca] R. Carmina, *The Nottingham Group*, in: M. Du Sautoy, D. Segal, A. Shalev (eds.), *New Horizons in pro-p Groups*, Progress in Math. **184** (2000), 205–221.

[CK1] A. Connes, D. Kreimer, *Hopf algebras, Renormalization and Noncommutative Geometry*, Comm. Math. Phys. **199** (1998), 203–242.

[CK2] ———, *Renormalization in quantum field theory and the Riemann-Hilbert problem I: the Hopf algebra structure of graphs and the main theorem*, Comm. Math. Phys. **210** (2000), 249–273.

[CK3] ———, *Renormalization in quantum field theory and the Riemann-Hilbert problem II: the β function, diffeomorphisms and the renormalization group*, Comm. Math. Phys. **216** (2001), 215–241.

[Dr] V. G. Drinfeld, *Quantum groups*, Proc. Intern. Congress of Math. (Berkeley, 1986), 1987, pp. 798–820.

[Fo1] L. Foissy, *Les algèbres de Hopf des arbres enracinés décorés, I*, Bull. Sci. Math. **126** (2002), 193–239.

[Fo2] ———, *Les algèbres de Hopf des arbres enracinés décorés, II*, Bull. Sci. Math. **126** (2002), 249–288.

[Fo3] ———, *Finite dimensional comodules over the Hopf algebra of rooted trees*, J. Algebra **255** (2002), 89–120.

[Ga1] F. Gavarini, *The quantum duality principle*, Annales de l'Institut Fourier **52** (2002), 809–834.

[Ga2] ———, *The global quantum duality principle: theory, examples, and applications*, preprint math.QA/0303019 (2003).

[Ga3] ———, *The global quantum duality principle*, to appear (2004).

[Ga4] ———, *The Crystal Duality Principle: from Hopf Algebras to Geometrical Symmetries*, J. of Algebra **285** (2005), 399–437.

[Je] S. Jennings, *Substitution groups of formal power series*, Canadian J. Math. **6** (1954), 325–340.

[LR] J.-L. Loday, M. O. Ronco, *Hopf algebra of the planar binary trees*, Adv. Math. **139** (1998), 293–309.

[Re] C. Reutenauer, *Free Lie Algebras*, London Mathematical Society Monographs, New Series **7**, Oxford Science Publications, New York, 1993.