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"Tressages des groupes de Poisson formels à dual quasitriangulaire"

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also translated in English as

"Braidings of Poisson groups with quasitriangular dual"

RESUMÉ

Soit $\mathfrak{g}$ une bigèbre de Lie quasitriangulaire sur un corps k de characteristique zero, et soit $\mathfrak{g}^*$ sa bigèbre de Lie duale. Nous prouvons que le groupe de Poisson formel $F[[\mathfrak{g}^*]]$ est une algèbre de Hopf tressée. Plus en général, nous prouvons que si $\big(U_h, R\big)$ est une QUEA (au sens de Drinfeld) quasitriangulaire, alors $\Big({U_h}', Ad(R)\big|_{{U_h}' \otimes {U_h}'}\Big)$ — où ${U_h}'$ est defini par Drinfeld — est une QFSHA (au sens de Drinfeld) tressée. Le premier resultat alors est une consequence directe de l'existence d'une quantification quasitriangulaire (U_h, R) de $U(\mathfrak{g})$ et du fait que ${U_h}'$ est une quantification de $F[[\mathfrak{g}^*]]$.

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ABSTRACT

Let $\mathfrak{g}$ be a quasitriangular Lie bialgebra over a field k of characteristic zero, and let $\mathfrak{g}^*$ be its dual Lie bialgebra. We prove that the formal Poisson group $F[[\mathfrak{g}^*]]$ is a braided Hopf algebra. More generally, we prove that if $\big(U_h, R\big)$ is any quasitriangular QUEA (in Drinfeld' sense), then $\Big({U_h}', Ad(R)\big|_{{U_h}' \otimes {U_h}'}\Big)$ — where ${U_h}'$ is defined by Drinfeld — is a braided QFSHA (in Drinfeld' sense). The first result is then just a consequence of the existence of a quasitriangular quantization (U_h, R) of $U(\mathfrak{g})$ and of the fact that ${U_h}'$ is a quantization of $F[[\mathfrak{g}^*]]$.

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References

[CP] V. Chari, A. Pressley, *A guide to Quantum Groups*, Cambridge University Press, Cambridge, 1994.

[Di] J. Dieudonné, *Introduction to the theory of formal groups*, Pure and Applied Mathematics, vol. 20, Marcel Dekker, Inc., New York, 1973.

[D1] V. G. Drinfeld, *Hamiltonian structures on Lie groups, Lie bialgebras and the geometric meaning of classical Yang-Baxter equations.*, Dokl. Akad. Nauk SSSR **268** (1983), 285–287.

[D2] V. G. Drinfeld, *Hopf algebras and the quantum Yang-Baxter equation*, Dokl. Akad. Nauk SSSR **283** (1985), 1060–1064.

[D3] V. G. Drinfeld, *Quantum groups*, Proc. Intern. Congress of Math. (Berkeley, 1986), 1987, pp. 798–820.

[EK] P. Etingof, D. Kazhdan, *Quantization of Lie bialgebras, I*, Selecta Math. (New Series) **2** (1996), 141.

[G1] F. Gavarini, *Geometrical Meaning of R-matrix action for Quantum groups at Roots of 1*, Commun. Math. Phys. **184** (1997), 95–117.

[G2] F. Gavarini, *The R-matrix action of untwisted affine quantum groups at roots of 1* (to appear in Jour. Pure Appl. Algebra).

[On] A. L. Onishchik, *Lie Groups and Lie Algebras I*, Encyclopaedia of Mathematical Sciences, vol. 20, Springer-Verlag, Berlin, 1993.

[Re] N. Reshetikhin, *Quasitriangularity of quantum groups at roots of 1*, Commun. Math. Phys. **170** (1995), 79–99.

[Tu] V. G. Turaev, *The Yang-Baxter equation and invariants of links*, Invent. Math. **92** (1988), 527–553.

[WX] A. Weinstein, P. Xu, *Classical Solutions of the Quantum Yang-Baxter Equation*, Commun. Math. Phys. **148** (1992), 309–343.