Communications in Mathematical Physics **184** (1997), no. 1, 95–117
DOI: 10.1007/s002200050054

The final publication is available at Springer via
http://www.springerlink.com/content/9c34gj7gm38xglta/

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"Geometrical Meaning of R-matrix action for Quantum Groups at Roots of 1"

ABSTRACT

The present work splits in two parts: first, we perform a straightforward generalization of results from [Re], proving that quantum groups $U_q^M(\mathfrak{g})$ and their unrestricted specializations at roots of 1, in particular the function algebra $F[H]$ of the Poisson group H dual of G, are braided; second, as a main contribution, we prove the convergence of the (specialized) R-matrix action to a birational automorphism of a 2ℓ-fold ramified covering of $Spec\left(U_\varepsilon^M(\mathfrak{g})\right)^{\times 2}$ when ε is a primitive ℓ-th root of 1, and of a 2-fold ramified covering of H, thus giving a geometric content to the notion of triangularity (or braiding) for quantum groups at roots of 1.

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References

[DD] I. Damiani, C. De Concini, *Quantum groups and Poisson groups*, Representations of Lie groups and quantum groups (Trento, 1993) (W. Baldoni, M. Picardello, eds.), Pitman Res. Notes Math. Ser. **311**, Longman Scientific & Technical 1994, pp. 1–45.

[DK] C. De Concini, V. G. Kac, *Representations of Quantum Groups at Roots of 1*, Progr. in Math. **92** (1990), 471–506.

[DKP] C. De Concini, V. G. Kac, C. Procesi, *Quantum coadjoint action*, Jour. Am. Math. Soc. **5** (1992), 151–189.

[DL] C. De Concini, V. Lyubashenko, *Quantum function algebra at roots of 1*, Adv. Math. **108** (1994), 205–262.

[DP] C. De Concini, C. Procesi, *Quantum groups*, D-modules, Representation Theory, and Quantum Groups (Venice, 1992) (L. Boutet de Monvel, C. De Concini, C. Procesi, P. Schapira, M. Vergne, eds.), Lectures Notes in Mathematics **1565**, Springer & Verlag, Berlin–Heidelberg–New York, 1993, pp. 31–140.

[Dr] V. G. Drinfeld, *Quantum groups*, Proceedings of the ICM (Berkeley, California, 1986) (Andrew

M. Gleason, ed.), Amer. Math. Soc., Providence, RI, 1987, pp. 798–820.

[Ex] H. Exton, *q–Hypergeometric Functions and Applications*, Ellis Hordwood Series *Mathematics and its Applications*, Ellis Hordwood Limited, 1983.

[GR] G. Gasper, M. Rahman, *Basic hypergeometric series*, Encyclopedia of Mathematics and its Applications **35**, Cambridge University Press, 1990.

[Ji] M. Jimbo, *A q–difference analogue of $U(\mathfrak{g})$ and the Yang-Baxter equation*, Lett. Math. Phys. **10** (1985), 63–69.

[KR] A. N. Kirillov, N. Reshetikin, *q–Weyl Group and a Multiplicative Formula for Universal R–Matrices*, Comm. Math. Phys. **134** (1990), 421–431.

[LS] S. Z. Levendorskii, Ya. S. Soibelman, *Some applications of the quantum Weyl groups*, J. Geom. Phys. **7** (1990), 241–254.

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

[Ta] T. Tanisaki, *Killing forms, Harish-Chandra Isomorphisms, and Universal R–Matrices for Quantum Algebras*, Internat. J. Modern Phys. A **7** (1992), 941–961.