

N. Ciccoli, R. Fioresi, F. Gavarini

“Quantization of Projective Homogeneous
Spaces and Duality Principle”

Journal of Noncommutative Geometry **2** (2008), 449–496

DOI: 10.1007/978-3-8348-9831-9_4

ABSTRACT

We introduce a general recipe to construct quantum projective homogeneous spaces, with a particular interest for the examples of the quantum Grassmannians and the quantum generalized flag varieties. Using this construction, we extend the quantum duality principle to quantum projective homogeneous spaces.

REFERENCES

- [1] F. Bonechi, N. Ciccoli, R. Giachetti, E. Sorace, M. Tarlini, *The coisotropic subgroup structure of quantum $SL(2, \mathbb{R})$* , J. Geom. Phys. **37** (2001), 190–200.
- [2] A. Borel, *Linear algebraic groups*, Graduate Texts in Mathematics **126**, Springer-Verlag, New York-Heidelberg, 1991.
- [3] V. Chari, A. Pressley, *Quantum Groups*, Cambridge Univ. Press, Cambridge, 1994.
- [4] N. Ciccoli, *Quantization of Co-isotropic Subgroups*, Lett. Math. Phys. **42** (1997), 123–138.
- [5] N. Ciccoli, F. Gavarini, *A quantum duality principle for coisotropic subgroups and Poisson quotients*, Adv. Math. **199** (2006), 104–135.
- [6] N. Ciccoli, F. Gavarini, *A global quantum duality principle for subgroups and homogeneous spaces*, work in progress.
- [7] N. Ciccoli, A. J.-L. Sheu, *Covariant Poisson structures on complex Grassmannians*, Comm. Anal. Geom. **14** (2006), 443–474.
- [8] C. De Concini, D. Eisenbud, C. Procesi, *Young Diagrams and Determinantal Varieties*, Invent. Mathematicæ **56** (1980), 129–165.
- [9] R. Fioresi, *Quantum deformation of the Grassmannian manifold*, J. Algebra **214** (1999), 418–447.
- [10] ———, *A deformation of the big cell inside the Grassmannian manifold $G(r, n)$* , Rev. Math. Phys. **11** (1999), 25–40.
- [11] ———, *Quantum deformation of the flag variety*, Comm. Algebra **27** (1999), 5669–5685.
- [12] ———, *Quantum coinvariant theory for the quantum special linear group and Quantum Schubert varieties*, J. Algebra **242** (2001), 433–446.
- [13] F. Gavarini, *The quantum duality principle*, Ann. Inst. Fourier **52** (2002), 809–834.
- [14] ———, *The global quantum duality principle*, J. reine ang. Math. **612** (2007), 17–33 — see also the expanded version <http://arxiv.org/abs/math/0303019> (2003).
- [15] ———, *The global quantum duality principle: theory, examples, and applications*, electronic preprint <http://arxiv.org/abs/math/0303019> (2003).

- [16] K. Goodearl, T. Lenagan, *Quantized coinvariants at trascendental q* , in “*Hopf algebras in non commutative geometry and physics*”, Lecture Notes in Pure and Appl. Math. **239**, Dekker, 2005., pp. 155–165.
 - [17] P. Griffiths, J. Harris, *Principles of algebraic geometry*, Wiley Interscience, 1994.
 - [18] R. Hartshorne, *Algebraic Geometry*, Graduate Texts in Mathematics **52**, Springer-Verlag, New York-Heidelberg, 1977.
 - [19] S. Kolb, *The AS-Cohen-Macaulay property for quantum flag manifolds of minuscule weight*, J. Algebra (to appear— see also <http://arxiv.org/abs/0707.1389> (2007)).
 - [20] L. Korogodsky, Y. Soibelman, *Algebras of functions on quantum groups, Part I*, Math. Surv. and Monographs **56**, A.M.S., Providence (RI), 1998.
 - [21] A. Klimyk, K. Schmüdgen, *Quantum groups and their representations*, Texts and Monographs in Physics, Springer-Verlag, Berlin, 1997.
 - [22] V. Lakshmibai, N. Reshetekhin, *Quantum flag and Schubert schemes*, Contemp. Math. **134** (1992), 145–181.
 - [23] V. Lakshmibai, C. S. Seshadri, C. Musili, *Geometry of G/P . IV. Standard monomial theory for classical types*, Proc. Indian Acad. Sci. Sect. A Math. Sci. **88**, 1979, pp. 279–362.
 - [24] J. H. Lu, *Multiplicative and affine Poisson structures on Lie groups*, Ph.D. thesis University of California, Berkeley, 1990 — see also <http://hkumath.hku.hk/~jhlu/thesis.tex>.
 - [25] Y. Manin, *Topics in non commutative geometry*, M. B. Porter Lectures, Princeton University Press, Princeton, 1991.
 - [26] S. Montgomery, *Hopf Algebras and Their Actions on Rings*, CBMS Regional Conference Series in Mathematics **82**, AMS, Providence, 1993.
 - [27] Y. S. Soibelman, *On the quantum flag manifold*, Func. Ana. Appl. **25** (1992), 225–227.
 - [28] E. Taft, J. Towber, *Quantum deformation of flag schemes and Grassmann schemes, I. A q -deformation of the shape-algebra for $GL(n)$* , J. Algebra **142** (1991), 1–36.
 - [29] S. Zakrzewski, *Poisson homogeneous spaces*, J. Lukierski, Z. Popowicz, J. Sobczyk (eds.), *Quantum groups* (Karpacz, 1994), PWN, Warsaw, 1995, pp. 629–639.
-
-