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CORRECTION TO THE ARTICLE QUIVER GRASSMANNIANS, QUIVER VARIETIES AND THE PREPROJECTIVE ALGEBRA

ALISTAIR SAVAGE AND PETER TINGLEY

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For quivers not of finite or affine type, certain isomorphisms asserted in the article under correction do not hold, as pointed out by Sarah Scherotzke. This note describes the affected results briefly. A corrected version of the paper can be found at arXiv 0909.3746.

The original published version of this paper contained the following errors. We thank Sarah Scherotzke for bringing this to our attention.

Error 1. If $\mathfrak{g}$ is not of finite or affine type, then the Nakajima quiver variety $\Lambda(v, w)$ is not actually isomorphic to the variety $\mathrm{Gr}(v, q^w)$ of all v-dimensional subrepresentations of the injective module q^w. In fact, beyond affine type, $\mathrm{Gr}(v, q^w)$ does not have a natural variety structure, or, at least, is not finite-dimensional. This is because there are continuous families of nonisomorphic modules, all of which have a nontrivial extension with some one-dimensional simple module S_i.

There are two ways to modify the statement to make it true, and, with either of these modifications, the work in the original paper does prove the correct result. One must replace $\mathrm{Gr}(v, q^w)$ with either the variety $\mathrm{NGr}(v, q^w)$ of nilpotent v-dimensional subrepresentations of q^w, or with the variety $\mathrm{Gr}(v, \tilde{q}^w)$ of all v-dimensional subrepresentations, but where the injective hull q^w in the category of all representations of the preprojective algebra has been replaced with the injective hull $\tilde{q}^w$ in the category of locally nilpotent representations. Our work shows that these are naturally isomorphic, and are also isomorphic to $\Lambda(v, w)$.

Error 2. Lemma 2.9 (which essentially asserted that $\mathrm{Gr}(v, q^w)$ and $\mathrm{NGr}(v, q^w)$ were isomorphic) is false beyond affine type, and should be removed. The proof is simply incorrect. In fact, this caused most of the issues in Error 1.

MSC2010: 16G20.
Keywords: quiver grassmannian, quiver variety, preprojective algebra.

A corrected version of the paper that addresses these points can be found at arXiv 0909.3746. We show that both of the fixes to Error 1 discussed above work, although we mainly work with $\mathrm{Gr}(v, \tilde{q}^w)$. The reason is that $\tilde{q}^w$ is a direct limit of finite-dimensional varieties, and each quiver grassmannian is contained in one of these. Thus, with this viewpoint, the quiver grassmannians are naturally subvarieties of ordinary grassmannians, which we find helpful.

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PACIFIC JOURNAL OF MATHEMATICS

Volume 275 No. 2 June 2015

A combinatorial characterization of tight fusion frames 257
MARCIN BOWNIK, KURT LUOTO and EDWARD RICHMOND

Combinatorics of finite abelian groups and Weil representations 295
KUNAL DUTTA and AMRITANSHU PRASAD

Compact anti-de Sitter 3-manifolds and folded hyperbolic structures on surfaces 325
FRANÇOIS GUÉRITAUD, FANNY KASSEL and MAXIME WOLFF

Circular handle decompositions of free genus one knots 361
FABIOLA MANJARREZ-GUTIÉRREZ, VÍCTOR NÚÑEZ and ENRIQUE RAMÍREZ-LOSADA

A pointwise a-priori estimate for the $\bar{\partial}$-Neumann problem on weakly pseudoconvex domains 409
R. MICHAEL RANGE

Explicit Hilbert–Kunz functions of 2×2 determinantal rings 433
MARCUS ROBINSON and IRENA SWANSON

The Johnson–Morita theory for the ring of Fricke characters of free groups 443
TAKAO SATOH

Global representations of the conformal group and eigenspaces of the Yamabe operator on $S^1 \times S^n$ 463
MARK R. SEPANSKI and JOSE A. FRANCO

Rota–Baxter operators on the polynomial algebra, integration, and averaging operators 481
SHANGHUA ZHENG, LI GUO and MARKUS ROSENKRANZ

Correction to the article Quiver grassmannians, quiver varieties and the preprojective algebra 509
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