
THE WEIZMANN INSTITUTE OF SCIENCE
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE
Algebraic Geometry and Representation Theory Seminar

Room 155 ,Ziskind Building
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Quantum affine algebras and Grassmannians

Abstract:

Let $\mathfrak{g} = \mathfrak{sl}_n$ and $U_q(\widehat{\mathfrak{g}})$ the corresponding quantum affine algebra. Hernandez and Leclerc proved that there is an isomorphism Φ from the Grothendieck ring \mathcal{R}_{ℓ} of a certain subcategory \mathcal{C}_{ℓ} of finite-dimensional $U_q(\widehat{\mathfrak{g}})$ -modules to a certain quotient $\mathbb{C}[\mathrm{Gr}(n, n+\ell+1, \sim)]$ of a Grassmannian cluster algebra. We proved that this isomorphism induces an isomorphism $\widetilde{\Phi}$ from the monoid of dominant monomials to the monoid of semi-standard Young tableaux. Using this result and the results of Qin and the results of Kashiwara, Kim, Oh, and Park, we have that every cluster monomial (resp. cluster variable) in a Grassmannian cluster algebra is of the form $\mathrm{sch}(T)$ for some real (resp. prime real) rectangular semi-standard Young tableau T , where $\mathrm{sch}(T)$ is certain map obtained from a formula of Arakawa--Suzuki. We also translated Arakawa--Suzuki's formula to the setting of q -characters and apply it to study real modules, prime modules, and compatibility of cluster variables.

This is joint work with Wen Chang, Bing Duan, and Chris Fraser.