

ALGEBRA SEMINAR

Speaker: Mykola Semeniakin

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Date: Thursday, November 12, 2020

Time: 1:00 PM

Location: Zoom

Zoom URL: notredame.zoom.us/j/93342319824?pwd=SzQwMGNrTjRKb0l1NEgxUE9KTXlwQT09

Lecture Title:

Solution of tetrahedron equation from cluster algebras

Abstract

Language of cluster algebras is known to be convenient for description of various different phenomena in mathematical physics, and sometimes serves for demystification of those. In the talk I will demonstrate one example of this kind: how the mysterious solution of tetrahedron equation (3d generalization of Yang-Baxter equation) explicitly constructed by Bazhanov and Sergeev, appears to be the basic and very well known building block in the theory of cluster algebras. I will start from explanation, what tetrahedron equation is, how it is related to Yang - Baxter equation, and present Bazhanov-Sergeev solution of it. Then I will introduce planar networks, Poisson algebra related to paths on them, and recall how they and their 'isomorphisms' fit into the theory of cluster algebras. Finally, I will show how the simplest four-gonal planar network gives the Bashanov-Sergeev Lax operator, and composition of four network transformations, known as 'spider moves', gives tetrahedron relation for those. If time will permit, I will also explain, how using this block one can construct integrable system, whose spectral curve is an arbitrary symmetric Newton polygon. The talk will be based on our recent paper with P. Gavrylenko and Y. Zenkevich: arxiv.org/abs/2010.15871