

CLUSTER ALGEBRAS SEMINAR

Speaker: Li Yu
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Date: Thursday, January 31, 2019

Time: 3:00 PM

Location: Math Bunker, Hayes-

Lecture Title:

Quantum boson algebra and Poisson geometry of the flag variety

Abstract

Fix a root system Φ . In this talk we will construct Kashiwara operators associated to each positive root in Φ acting on the negative half of the quantum group associated to Φ . These Kashiwara operators allow us to define a variant of Kashiwaras quantum boson algebra. We study *PBW*, Levendorskii-Soibelman and Leibniz type properties of the boson algebra, both at the quantum and the quasi-classical levels. In particular, we will explain in detail the Poisson geometry of the quasi-classical limit P of the positive half of the quantum boson algebra. As an algebra, P turns out to be the polynomial algebra generated by the quasi-classical limit of the Kashiwara operators. We prove that P has a structure of a symmetric Poisson *CGL* extension, hence a structure of a cluster algebra by the work of Goodearl and Yakimov. In fact, we will establish a Poisson isomorphism from P to the coordinate ring of the open Bruhat cell in the flag variety of type Φ equipped with the standard Poisson structure. In type A_n , we construct vector fields $F_{i,j}$ ($1 \leq i \leq j \leq n$) such that the Schouten bracket of $F_{i,j}$ with the Poisson bivector π on $\text{Spec}(P)$ is a Poisson bivector which is compatible with π .