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# Representation and Number Theory Seminar

## (Bethe subalgebras of Yangians and Kirillov-Reshetikhin crystals)

by

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**Abstract:** (joint project with Aleksei Ilin, Vasily Krylov, and Inna Mashanova-Golikova)  
Bethe subalgebras  $B(C)$  form a family of maximal commutative subalgebras in the Yangian  $Y(\mathfrak{g})$  of a semisimple Lie algebra  $\mathfrak{g}$  depending on a group element  $C$  of the corresponding adjoint group  $G$ . The images of Bethe algebras in tensor products of fundamental representations can be regarded as the integrals of the quantum XXX Heisenberg magnet chain. On the other hand, according to Maulik and Okounkov, Bethe subalgebras arise as equivariant quantum cohomology rings of Nakajima quiver varieties. We give some reasonable sufficient conditions on a representation  $V$  of the Yangian of type  $A$  guaranteeing that  $B(C)$  acts on  $V$  without multiplicities. We show that this property holds for certain limits of Bethe subalgebras as well. This allows us to define a KR-crystal structure on the spectrum of a Bethe subalgebra on  $V$ . Conjecturally, the monodromy of the spectrum of  $B(C)$  along  $C$  is given by Schutzenberger involutions of this crystal.

Date : January 25, (Tuesday)

Time : 4:30pm – 5:30pm (Hong Kong SAR)

Zoom link :

<https://cuhk.zoom.us/j/97838822137?pwd=ZTVvSC9abmNjR3RCcS9FTzJNTVhXdz09>

Meeting ID: 978 3882 2137

Passcode : sesame

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