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**Wed 12th Oct, 10h30am**

**Rinat Kedem**

**Title**

Graded Characters, Quantum Q-systems, and spherical DAHA

**Abstract**

The tensor products of finite-dimensional representations of affine algebras has a natural grading, e.g. as defined by Feigin and Loktev, reflecting the low lying physical spectrum of generalized Heisenberg spin chains. The combinatorial structure of the graded characters of these products, computed from the Bethe ansatz, is governed by the Q-systems, equations satisfied by characters of KR-modules. They are mutations in a cluster algebra, whose quantization is responsible for the grading. The quantum Q-system is an integrable discrete dynamical system for the non-commutative cluster variables, which generate the spherical DAHA in the  $q$ -Whittaker limit. The commuting Hamiltonians are quantizations of quantum Toda Hamiltonians, obtained from the Macdonald operators via duality in the  $q$ -Whittaker limit. The graded characters are generalized  $q$ -Whittaker functions and satisfy  $q$ -difference equations given by the generalized Toda Hamiltonians.