

## **Non-Commutative Integrability, Paths and Quasi-determinants: Towards NonCommutative Cluster Algebras**

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Classical Q-systems arising from the representation theory of quantum spin chains are part of some natural cluster algebras. Here we describe a non-commutative version thereof, based on the Q-system path model solutions. The main ingredient is discrete integrability, namely the existence of conserved quantities modulo the Q-system. In the case of rank 2, this leads to a natural general definition of noncommutative cluster algebra. For higher rank, we find that the Q-system must be replaced by a discrete non-commutative Hirota equation involving Gelfand-Retakh quasideterminants of discrete Wronskian matrices. (Joint work with Rinat Kedem, *Advances in Mathematics* 228 (2011) 97152).