From (derived) Hall algebras to acyclic quantum cluster algebras

Inspired by Caldero-Keller's discovery of the similarity between the multiplication formulas in a cluster algebra and that in a (dual) Hall algebra, one can expect to relate (derived) Hall algebras associated to certain categories to acyclic quantum cluster algebras via quantum cluster characters. First, we discuss an algebra homomorphism from the dual Hall algebra associated to Rep(Q) (category of representations of an acyclic quiver Q) to the corresponding quantum cluster algebra. Then we address the connection from two certain quotients of subalgebras of the derived Hall algebras of Rep(Q) to acyclic quantum cluster algebra. Finally, we give cluster multiplication formulas via the above derived Hall algebras.

This talk is based on joint work with Ming Ding and Fan Xu, and with Ming Ding and Haicheng Zhang.