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Cluster Realization and Tensor Product Decomposition of Positive Representations

For each simple Lie algebra $\mathfrak{g}$, a cluster realization of the corresponding Drinfeld-Jimbo quantum groups $U_q(\mathfrak{g})$ has been found via the positive representations, where an embedding into a quantum torus algebra $X_{\mathfrak{g}}$ is described by certain quiver diagram. Using this new realization, we discuss its application towards the proof of the tensor product decomposition of the positive representations of split real quantum groups restricted to the Borel part, as well as the full decomposition in type A_n found recently by Schrader-Shapiro related to the spectral decomposition of the Hamiltonians of certain open Coxeter-Toda system.