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Crystal Structure of Localized Quantum Unipotent Coordinate Category

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For a monoidal category $\mathcal{T}$, if there exists a "real commuting family $(C_i, R_{C_i}, \phi_i)_{i\in I}$", we can define a localization $\widetilde{\mathcal{T}}$ of $\mathcal{T}$ by $(C_i, R_{C_i}, \phi_i)_{i\in I}$.
Let $R = R(\mathfrak{g})$ be the quiver Hecke algebra(=KLR algebra) associated with a symmetrizable Kac-Moody Lie algebra $\mathfrak{g}$ and C_w the subcategory of R-gmod(=the category of graded finite-dimensional R-modules) associated with a Weyl group element w, which is a monoidal category with a real commuting family $(C_i, R_{C_i}, \phi_i)_{i\in I}$. Thus, we get its localization $\widetilde{C}_w$, which is called a "localized quantum unipotent coordinate category" associated with w. In the former half of the talk, we shall present that for a (semi-)simple $\mathfrak{g}$ and the longest element w_0, the family of self-dual simple modules in $\widetilde{C}_{w_0} = \widetilde{R\text{-gmod}}$ holds a crystal structure and is isomorphic to the cellular crystal $\mathbb{B}_{i_1\dots i_N}$ where $i_1 \dots i_N$ is an arbitrary reduced word of w_0. Furthermore, in the latter half of the talk, the latest result, which is a joint work with M. Kashiwara, will be presented that for a general symmetrizable Kac-Moody Lie algebra $\mathfrak{g}$ and a general Weyl group element w, the family of self-dual simple modules in the localized category $\widetilde{C}_w$ also holds a crystal structure, and it is isomorphic to the cellular crystal $\mathbb{B}_{i_1\dots i_m}$ associated with a reduced word $i_1 \cdots i_m$ of w.

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