Ph.D. Thesis presentation

2020.12.10. Thr. 4:30 pm R1418

Young-Hun Kim Sogang University

Cyclic $H_n(0)$ -modules with a basis parametrized by a left Bruhat interval

ABSTRACT

The 0-Hecke algebra $H_n(0)$ is a deformation of the group algebra of the symmetric group \mathfrak{S}_n . It is a \mathbb{C} -algebra generated by $\pi_1, \pi_2, \ldots, \pi_{n-1}$ (resp. $\overline{\pi}_1, \overline{\pi}_2, \ldots, \overline{\pi}_{n-1}$) which are idempotents (resp. anti-idempotents) and satisfy the braid relations of \mathfrak{S}_n and has a basis $\{\pi_\sigma\}_{\sigma \in \mathfrak{S}_n}$ (resp. $\{\overline{\pi}_\sigma\}_{\sigma \in \mathfrak{S}_n}$).

The first theme of this talk concerns the projective covers of $H_n(0)$ -modules \mathcal{V}_{α} , X_{α} , and $\mathbf{S}_{\alpha}^{\sigma}$ which categorify the dual immaculate quasisymmetric function, the extended Schur function, and the quasisymmetric Schur function when σ is the identity, respectively. We show that the projective cover of \mathcal{V}_{α} is the projective indecomposable module \mathbf{P}_{α} due to Norton, and X_{α} and the ϕ -twist of the canonical submodule $\mathbf{S}_{\beta,C}^{\sigma}$ of $\mathbf{S}_{\beta}^{\sigma}$ for (β, σ) 's satisfying suitable conditions appear as $H_n(0)$ -homomorphic images of \mathcal{V}_{α} . Moreover, we construct the projective cover of $\mathbf{S}_{\alpha,E}^{\sigma}$ of $\mathbf{S}_{\alpha}^{\sigma}$.

The second theme of this talk concerns cyclic $H_n(0)$ -modules of the form $H_n(0)\pi_{\sigma}\overline{\pi}_{\rho}$. We find a basis for $H_n(0)\pi_{\sigma}\overline{\pi}_{\rho}$ whose elements are parametrized by a left Bruhat interval. Furthermore, we describe $\mathbf{P}_{\alpha}, \mathcal{V}_{\alpha}, X_{\alpha}$, and $\mathbf{S}_{\alpha,E}^{\sigma}$ as the form $H_n(0)\pi_{\sigma}\overline{\pi}_{\rho}$. In addition, we give an explicit (anti-)automorphism twists, the induced module, and the restricted module of $H_n(0)\pi_{\sigma}\overline{\pi}_{\rho}$.

Contact: Young-Hun Kim (K222) yhkim14@sogang.ac.kr