

YOUNG'S SEMINORMAL FORM OVER FIELDS OF POSITIVE CHARACTERISTIC.

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Let \mathcal{H}_n denote either the Ariki-Koike algebra or the cyclotomic degenerate Hecke algebra. In an important recent paper, J. Brundan and A. Kleshchev showed that \mathcal{H}_n is a \mathbb{Z} -graded algebra by establishing an isomorphism between \mathcal{H}_n and the cyclotomic Khovanov-Lauda-Rouquier algebra of type A .

In this talk we focus on the symmetric group case in characteristic p . This is a highly nontrivial special case of the above work. We give a natural construction of the important intertwining elements ϕ_i that appear in it. Indeed, we see them as natural analogues of certain elements Ψ_i of the Hecke algebra introduced by Murphy during his treatment of Young's seminormal form, although only in the semisimple case. We show that Murphy's construction of Ψ_i can be done in positive characteristic as well.

An essential ingredient of this is the Gelfand-Zetlin algebra as a kind of Cartan subalgebra of a semisimple Lie algebra, in accordance with the programme initiated by Okounkov and Vershik in the article "A new approach to the representation theory of the symmetric group". We show that over the ground ring, the Specht modules can be realized as induced modules from the Gelfand-Zetlin subalgebra.

This leads in a natural way to a conjecture for the projective modules for S_n , which would give a formula for the decomposition numbers.