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Tableaux posets and the fake degrees of coinvariant algebras.

The theory surrounding the coinvariant algebra R of a complex reflection group G exemplifies the beautiful interplay between representation theory, tableaux combinatorics, and symmetric function theory. Here R is a graded G -module. Lusztig’s so-called “fake degrees” are polynomials encoding the graded irreducible decomposition of these G -modules and have been studied extensively. Our main result is an essentially complete classification for which irreducibles appear in which degrees of arbitrary complex reflection groups, or equivalently which fake degree coefficients are non-zero. The most involved step of our argument is the type A case where we introduce a new partial order on the standard Young tableaux of a given partition shape which is ranked by the major index statistic up to a shift. The poset is constructed from explicit combinatorial manipulations on tableaux. Building on work of Specht, Shephard–Todd, Stembridge, and others, we are able to amplify the classification to the full infinite family $G(m, d, n)$. (Received August 24, 2018)