A CRYSTAL BASIS FOR TWO-ROW KRONECKER COEFFICIENTS

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ABSTRACT. The Kronecker coefficient $g_{\lambda\mu\nu}$ is the multiplicity of the $GL(V) \times GL(W)$-irreducible $V_\lambda \otimes W_\mu$ in the restriction of the $GL(X)$-irreducible X_ν via the natural map $GL(V) \times GL(W) \to GL(X)$, where $X = V \otimes W$. A difficult open problem in algebraic combinatorics is to find a positive combinatorial formula for these coefficients. In the dim $V = \dim W = 2$ case, we construct a global crystal basis for X_ν as a $U_q(\mathfrak{gl}(V)) \otimes U_q(\mathfrak{gl}(W))$-module and obtain nice formulas for two-row Kronecker coefficients by counting highest weight basis elements. We also briefly discuss the current status of extending this approach to harder cases. This is joint work with Ketan Mulmuley and Milind Sohoni.