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Parabolic Refined Invariants and Macdonald Polynomials

A string theoretic derivation is given for the conjecture of Hausel, Letellier and Rodriguez-Villegas on the cohomology of character varieties with marked points, which is identified with a refined BPS expansion in the stable pair theory of a local root stack. Haiman's geometric construction for Macdonald polynomials is shown to emerge naturally in this context via geometric engineering. In particular this yields a new conjectural relation between Macdonald polynomials and refined orbifold curve counting invariants. This is joint work with W.y. Chuang, R. Donagi and T. Pantev.