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The Super ∇-Operator

I will describe a super version of the ∇ operator on the combinatorial Macdonald polynomials: $\widetilde{H}_\mu(\boldsymbol{x})$. For an extra set of variables $\boldsymbol{y}$, it is obtained by considering $\widetilde{H}_\mu(\boldsymbol{y})$ as an "eigenvalue" for $\widetilde{H}_\mu(\boldsymbol{x})$. After explaining why this new operator naturally contains and generalizes all instances of the operators involved in the Δ-conjecture, we will establish some of its properties. If time allows, we will discuss how to "lift" it to more parameters than just q and t, and associated implications regarding a bosonic-fermionic duality. This is joint work with J. Haglund, A. Iraci, and M. Romero.