

Math Physics Seminar - Benjamin Brubaker, University of Minnesota, SCHM 316

Wednesday, Mar 26th 1:30 - 2:30pm

Title: A universal lattice model for Hecke-Grothendieck polynomials

Abstract: Many of the special functions we study in geometry, algebra, and the representation theory have recursive definitions via divided difference operators. These include Schubert and Grothendieck polynomials (representing cohomological and K-theoretic classes in the flag variety) and various generalizations and specializations of Macdonald polynomials (including Iwahori Whittaker functions). Kirillov unified all such examples with a five-parameter family known as Hecke-Grothendieck polynomials. We present a new (and strange) family of solvable lattice models whose partition functions realize every such family of Hecke-Grothendieck polynomials, leading to new positivity results resolving conjectures of Kirillov from 2015. What's missing is a complete (multi-parameter) quantum group module interpretation for the lattice model, though we know some special cases, and we invite audience participation to resolve this! Along the way, we'll review how quantum groups give rise to special functions via solvable lattice models, so no prior familiarity is necessary. This is joint work with my PhD student Suki Dasher and prior work of ours with the 2023 Polymath Jr. Program.