

Recent Problems in Partitions and Other Combinatorial Functions

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In this talk, I will discuss recent work, joint with a number of collaborators, on analytic and combinatorial properties of the partition and related functions. This includes work on recent conjectures of Stanton, which aim to give a deeper understanding into the “rank” and “crank” functions which “explain” the famous partition congruences of Ramanujan. I will describe progress in producing such functions for other combinatorial functions using the theory of modular and Jacobi forms and recent connections with Lie-theoretic objects due to Gritsenko-Skoruppa-Zagier. I will also discuss how analytic questions about partitions can be used to study Stanton’s conjectures, as well as recent conjectures on partition inequalities due to Chern-Fu-Tang and Heim-Neuhauser, which are related to the Nekrasov-Okounkov formula.