1063-11-170 **B. Brubaker**, **D. Bump** and **S. Friedberg*** (friedber@bc.edu), Mathematics Department, Boston College, Chestnut Hill, MA 02467-3806. *Combinatorial models for p-adic Whittaker functions.* Preliminary report.

The values of spherical Whittaker functions on reductive groups over nonarchimedean local fields are obtained as characters of representations, due to the formula of Casselman and Shalika. For example, in type A they are given by Schur polynomials. This description allows the evaluation of local integrals that arise in various Rankin-Selberg integrals. In this talk, I present several combinatorial models for the values of p-adic Whittaker functions on a *metaplectic cover* of such a group. One model involves crystal graphs, combinatorial objects that arise in the representation theory of quantum groups. The values of the p-adic Whittaker function may be regarded as giving a generalization of a character in which Gauss sums intervene. A second model involves constructions that are related to statistical mechanics. The p-adic Whittaker functions describe the states of an ice model, in which the Boltzmann weights are number theoretic. Even in the case of the trivial cover, this representation for the Schur polynomials is new. Moreover, there is an interesting interplay between these two approaches. This is all joint work with B. Brubaker and D. Bump, and parts are joint with G. Chinta and P. Gunnells. (Received August 15, 2010)