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The Theta Correspondence and Periods of Automorphic Forms

I will describe my work on relations between periods of automorphic forms on groups related by the theta correspondence. These relations can be interpreted as a comparison of relative trace formulas. One trace formula is standard however the other is novel in that it involves a kernel function built from theta functions. The result is a spectral identity relating the Fourier coefficients of automorphic forms on symplectic groups to periods over orthogonal subgroups of automorphic forms on orthogonal groups. Finally, I will describe work in progress where these ideas are applied to the arithmetic geometry of an integral model of a Shimura curve by considering a kernel built from the arithmetic theta functions, with values in arithmetic Chow groups, constructed by Kudla, Rapoport and Yang.