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Amy T. DeCelles* (adecelles@stthomas.edu). *Applications of Modern Analysis to Automorphic Forms and Analytic Number Theory.*

We discuss some recent applications of the spectral theory of automorphic forms, in particular, the use of modern analysis to obtain spectral identities systematically, with corollaries in analytic number theory, namely subconvexity of L-functions (Diaconu, Garrett, Letang), lattice point counting in symmetric spaces (D.), and vanishing of zeta and L-functions on the critical line (Bombieri, Garrett). The first two of these applications rely on “pre-trace” formulas obtained via automorphic differential equations. This approach necessitates a more careful treatment of analytic issues than one would usually need when using trace formula methods. Global automorphic and global zonal spherical Sobolev spaces provide a robust framework for decisively treating many of these analytic issues. The viewpoint of global automorphic Sobolev theory is also what has enabled Bombieri and Garrett to clarify the circumstances under which the existence of eigenvalues of pseudo-Laplacians give information about the vanishing of zeta functions. (Received August 29, 2016)