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Large values of automorphic forms and integrable systems

In work with F.Brumley we establish lower bounds on the sup-norm of Hecke-Maass cusp forms on congruence quotients of $GL(n, \mathbb{R})$. We prove uniform estimates for Jacquet-Whittaker functions, for example we show for $n = 3$ a connection with the Pearcey function. Our method revolves around the WKB approximation in physics, the classification of Lagrangian singularities and symplectic reduction of Hamiltonian group actions.