Effective Equidistribution in Homogeneous Dynamics with Applications in Number Theory

Abstract:

There is a rich connection between homogeneous dynamics and number theory, especially when dynamical results are effective (i.e., when rates of convergence for dynamical phenomena are known). In this final defense, I describe my research on the asymptotic distribution of almost-prime times in horospherical flows on the space of lattices, as well as on compact quotients of SL(n,R). In the compact setting, I obtain a result that implies density for almost-primes in horospherical flows, where the number of prime factors is independent of the basepoint, and in the space of lattices I show the density of almost-primes in abelian horospherical orbits of points satisfying a certain Diophantine condition. To prove this, I first give an effective equidistribution result for arbitrary horospherical flows on the space of lattices, which I then use to prove an effective rate for the equidistribution of arithmetic progressions in abelian horospherical flows, to which I then apply a combinatorial sieve.