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The dynamical construction of an automorphic function

I will present the construction of an automorphic function on the Jacobi group G (the Lie group consisting of the semidirect product of $SL(2, \mathbb{R})$ and the Heisenberg group). This function generalizes Jacobi theta function. The function is invariant under the action of a lattice in G and thus well defined in the quotient, but a priori only as a square-integrable function. We are able to show that the function is actually defined pointwise along the whole orbit of almost every point, under the geodesic flow. The construction uses dynamical ideals of renormalization, ergodicity of the geodesic flow, equidistribution of horocycle lifts, and a partition of unity suitably "adapted" to the flow. Joint work with Jens Marklof.