EFFECTIVE RATNER THEOREM FOR ASL(2, R) AND THE GAPS OF THE SEQUENCE $\sqrt{n}$ MODULO 1

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Abstract: Let $G = SL(2,\mathbb{R}) \ltimes \mathbb{R}^2$ and $\Gamma = SL(2,Z) \ltimes Z^2$. Building on recent work of Strombergsson we prove a rate of equidistribution for the orbits of a certain 1-dimensional unipotent flow of $\Gamma \backslash G$, which projects to a closed horocycle in the unit tangent bundle to the modular surface. We use this to answer a question of Elkies and McMullen by making effective the convergence of the gap distribution of sqrt n mod 1.