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*Rational Horocycle lifts and the tails of Quadratic Weyl sums*

Equidistribution of horocycles on hyperbolic surfaces has been used to dynamically answer several probabilistic questions about number-theoretical objects. In this talk we focus on horocycle lifts, i.e. curves on higher-dimensional manifolds whose projection to the hyperbolic surface is a classical horocycle, and their behaviour under the action of the geodesic flow. It is known that when such horocycle lifts are 'generic', then their push forward via the geodesic flow becomes equidistributed in the ambient manifold. We consider certain 'non-generic' (i.e. rational) horocycle lifts, in which case the equidistribution takes place on a sub-manifold. We then use this fact to study the tail distribution of quadratic Weyl sums when one of their arguments is random and the other is rational. In this case we obtain random variables with heavy tails, all of which only possess moments of order less than 4. Depending on the rational argument, we establish the exact tail decay, which can be described with the help of the Dedekind  $\psi$ -function. Joint work with Tariq Osman.