

**The Weizmann Institute of Science  
Faculty of Mathematics and Computer Science**

**Midrasha on Groups Seminar**

Lecture Hall - Room 1, Ziskind Building  
on Monday, Dec 09, 2024  
at 14:15

ZOOM

The seminar will be frontal and also on Zoom

**Zvi Shem-Tov**  
IAS

will speak on

**On the quantum unique ergodicity conjecture for hyperbolic arithmetic manifolds**

Abstract:

Suppose  $u_j$  is an orthonormal basis of eigenfunctions of the Laplacian on a compact Riemannian manifold, and consider the probability measures  $|u_j|^2 dvol$ . The quantum ergodicity theorem of Shnirelman, Zelditch and Colin de Verdiere, states that if the geodesic flow on the manifold is ergodic then there is a density one subsequence of these measures that equidistributes. What about the remaining eigenfunctions? The quantum unique ergodicity conjecture of Rudnick and Sarnak states that for hyperbolic manifolds (or more generally for negatively curved manifolds), any sequence of measures as above equidistributes. In 2006 Lindenstrauss proved that this is true for Hecke—Maass forms on congruence surfaces. These are eigenfunctions of both the Laplacian and the Hecke operators, which are discrete averaging operators coming from the arithmetic structure of the manifold.

We will discuss our extensions of Lindenstrauss' results to the three and (partially) four dimensional cases. One of the challenges that arise in the higher dimensional case is to rule out concentration of measure on totally geodesic submanifolds. We will focus on this issue and our new methods for showing non-concentration.

Based on joint works with Alexandre de Faveri and Lior Silberman.