

Hearing the shape of a locally symmetric space, and arithmetic groups

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I will discuss the famous question of Mark Kac “Can one hear the shape of a drum?” in the context of (compact) locally symmetric spaces. In a joint work with G. Prasad, we were able to resolve this question in many situations using our analysis of weakly commensurable arithmetic subgroups of algebraic groups. The notion of weak commensurability makes sense for arbitrary Zariski-dense subgroups and time permitting I will report on the ongoing project (joint with V. Chernousov and I. Rapinchuk) to develop a new form rigidity (called the eigenvalue rigidity) based on this concept. This work involves problems in the theory of algebraic groups of independent interest.