

Weakly-commensurable Zariski-dense subgroups and isospectral arithmetic compact locally symmetric spaces

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Andrei Rapinchuk and I have introduced a new notion of "weak-commensurability" of subgroups of two semi-simple groups. We have shown that the existence of weakly-commensurable Zariski-dense subgroups in semi-simple groups G_1 and G_2 lead to strong relationship between G_1 and G_2 . The key to understanding this is the existence of regular semi-simple elements in Zariski-dense subgroups with prescribed "local" behaviour proved by us earlier. Our results on weakly-commensurable arithmetic groups lead to a solution of the well-known problem "Can one hear the shape of a drum?" for arithmetic compact locally symmetric spaces. I will describe some of our results and outline the techniques used to prove them.