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Andrei Rapinchuk* (asr3x@virginia.edu), Department of Mathematics, University of Virginia, Kerchof Hall, P.O. Box 400137, Charlottesville, VA VA 22904. *Weakly commensurable arithmetic groups, with applications to locally symmetric spaces.*

I will present a recent joint work with Gopal Prasad in which we introduced and analyzed a new notion of weak commensurability of Zariski-dense subgroups. The most definitive results are available for S-arithmetic subgroups: it turns out that in many situations, weak commensurability of S-arithmetic subgroups implies their commensurability, and in all cases, the subgroups weakly commensurable to a given S-arithmetic subgroups split into finitely many commensurability classes. These results have important consequences for the well-known problem in differential geometry of analyzing lengths-commensurable and isospectral Riemannian manifolds. In particular, using our results we are able to answer Marc Kac's famous question "Can one hear the shape of a drum?" for compact arithmetically defined locally symmetric spaces. (Received August 06, 2008)