

Random Lattices as Sphere Packings

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In 1945, Siegel showed that the expected value of the lattice-sums of a function over all the lattices of unit co-volume in an n -dimensional real vector space is equal to the integral of the function. In 2012, Venkatesh restricted the lattice-sum function to a collection of lattices that had a cyclic group of symmetries and proved a similar mean value theorem. Using this approach, new lower bounds on the most optimal sphere packing density in n dimensions were established for infinitely many n .

In the talk, we will outline some analogs of Siegel's mean value theorem over lattices. This approach has modestly improved some of the best-known lattice packing bounds in many dimensions. We will also show how such results can be made effective and talk about some variations.

Joint work with Vlad Serban.

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