

ALGEBRA  
SEMINAR

*Lattice Point Counting and Arithmetic Statistics*

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**Abstract:** The Gauss Circle Problem asks how many lattice points are contained in a circle centered at the origin or radius  $R$ . A simple geometric argument establishes that this count is approximated by the area  $\pi R^2$ , with an error bounded by the perimeter  $O(R)$ .

“Arithmetic statistics” is about arithmetic objects – number fields, ideal class groups, and so on. Bhargava and many others have recently proved spectacular theorems by parametrizing such objects in terms of lattice points, and then using geometry to counting the lattice points.

Meanwhile, harmonic analysts have long known that you can do better than an error of  $O(R)$  in Gauss’s circle problem. I will describe a program to import such improvements into arithmetic statistics, and give an overview of the number theoretic results we hope to obtain.

This is ongoing joint work with Theresa Anderson and Takashi Taniguchi.

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