Surprising Connections in Number Theory

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Classical algorithms for approximating real numbers with rational numbers break down over fields with non-Euclidean rings of integers. Such algorithms are needed, however, for applications like lattice reduction in cryptography and gate approximation in quantum computing. In this talk I will present a way around the non-Euclidean obstacle using a new tool arising from the geometry of Minkowski space. This tool and the approximation algorithm it provides have geometric ties to class groups of quadratic fields, Apollonian circle packings, and ideal lattice-based cryptography. I will explore each of these connections, especially the cryptographic application.

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4:00 PM
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