The fractal nature of the Abelian Sandpile

Date Tuesday, February 14

Time 3:30 pm

Location 317 Mudd

Abstract: The Abelian Sandpile is a diffusion process on configurations of chips on the integer lattice $\mathcal{Z}^2$; a vertex with at least 4 chips *topples*, distributing one chip to each of its neighbors. One of the most striking unexplained features of the sandpile is that it appears to produce terminal configurations converging to a peculiar fractal limit when begun from increasingly large stacks of chips at the origin. In this talk, we will discuss a mathematical explanation for this fractal behavior. We will consider a conjecture regarding a precise fractal structure for the "Sandpile PDE" based on Apollonian circle packings, which allows us to construct fractal solutions giving exact geometric descriptions of portions of the limiting sandpile.