MANY CHEERFUL FACTS

presents

Lattices and Sphere Packings

a talk by Daniel Cristofaro-Gardiner

12:10–13:00 on Wednesday, April 2, in Evans 1015.

I'll discuss the sphere packing problem – how to most densely pack identical spheres into n-dimensional space. I'll explain how to calculate the "density" of a packing in a meaningful way and present examples of "good" packings in 2, 3, 4, and 8 dimensions. Along the way, I'll introduce how a lattice gives rise to a sphere packing, and use this as an excuse to discuss the constructions of several interesting lattices. I'll end by discussing some applications of sphere packings to data transmission and storage.

I am the very model of a modern Major General,
I've information vegetable, animal, and mineral,
I know the kings of England, and I quote the fights historical
From Marathon to Waterloo, in order categorical;
I'm very well acquainted, too, with matters mathematical,
I understand equations, both the simple and quadratical,
About binomial theorem I'm teeming with a lot o' news,
With many cheerful facts about the square of the hypotenuse!

— Gilbert & Sullivan, $P \circ P$

The website for Many Cheerful Facts is
`http://math.berkeley.edu/~mcf/`