MANY CHEERFUL FACTS

presents

Categorification: Where Easy Becomes Hard Becomes Easy

a talk by George Melvin

2:10–3:00pm on Tuesday, April 21, in 939 Evans.

Categorification is a word that induces fear and loathing amongst the best of us. This should not be so. Categorification is a way of thinking about higher structures in terms of tractable ideas and at its core is a process that everyone must embrace at some point in their lives; the power and necessity of abstraction. In recent years categorification has produced new and insightful results in representation theory, algebraic geometry, topology and knot theory.

In this talk we will present some categorified examples of relatively simple notions. In their paper 'Coxeter Functors and Gabriel's Theorem', Bernstein, Gelfand and Ponomarev (BGP) gave a proof of Gabriel's Theorem by introducing a categorified notion of a reflection in Euclidean space. We will see what Gabriel's Theorem states and study the BGP proof. Along the way we will learn about rigid Euclidean geometric objects (root systems), grown-up linear algebra and how, by categorifying the group of symmetries of a root system, Gabriel's Theorem pops out quite naturally. If there is time we will also see a categorified (formal) Fundamental Theorem of Calculus, introduced by Khovanov.

The only prerequisite is an open mind...

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/`