MANY CHEERFUL FACTS

presents

Kazhdan-Lusztig Theory and You

a talk by Brendon Rhoades
(University of Minnesota / MSRI)

12:10–13:00 on Wednesday, April 30, in Evans 1015.

Referred to as the 'angelic child' of the mathematics family by Alexander Kleschev, there are few objects more cheerful than the symmetric group S_n. In this talk we will explore the representation theory of S_n, and in particular take a close look at the isomorphism

$$\mathbb{C}[S_n] \cong \bigoplus_{\lambda \vdash n} f^\lambda S^\lambda,$$

where S^λ is the S_n-irrep corresponding to the partition λ and f^λ is the degree of S^λ. In particular, the left regular representation on the left hand side is 'easy to understand' whereas the irreducible modules on the right are 'rich' (a nice euphemism for 'not as easy'). In this talk we'll develop a basis for $\mathbb{C}[S_n]$ which will make the above isomorphism clear and satisfy a plethora of nice combinatorial, algebraic, and geometric properties. This will be done by 'enriching' the situation via the introduction of a quantum deformation of the symmetric group algebra and the development of polynomials that no one really knows a good method of explicitly computing. No prior representation theory knowledge will be assumed.

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/`