1012-14-226 **Allen Knutson*** (allenk@math.ucsd.edu) and **Paul Zinn-Justin**. *Statistical mechanics, the commuting variety, and Springer theory for the Brauer algebra.*

The *Brauer loop Hamiltonian* is an operator on the vector space spanned by chord diagrams of n chords in the disc. (This space is a module for the Brauer algebra, a mix of $\mathbb{C}[S_n]$ and the Temperley-Lieb algebra.) Its vacuum vector, appropriately scaled, assigns a natural number to each chord diagram.

Last year, the physicists de Gier and Nienhuis observed that *some* of these numbers occur as degrees of some varieties I introduced in the paper "Some schemes related to the commuting variety". With this, they conjectured the degree of the still-mysterious variety of commuting pairs of $n \times n$ matrices for $n \leq 8$. (Mathematicians had only been able to calculate these through $n = 4$.)

I'll describe the scheme we invented to complete this picture (giving the other numbers), and speculate on a Springer theory for the Brauer algebra. (Received September 21, 2005)