1014-05-1665 **Philip M Sternberg*** (sternberg@math.ucdavis.edu), Dept. of Math., One Shields Ave, Davis, CA 95616. *A conjecture for the combinatorial structure of crystals for all Kirillov-Reshetikhin modules of type* $D_n^{(1)}$.

One of the most significant breakthroughs in the study of the representation theory of quantum algebras (or quantum groups, as they are often called) was Kashiwara's discovery of crystal bases. Crystal bases are a completely discrete tool for working with modules over quantum algebras. A major open question in the study of quantum algebras is "For which modules over which algebras do crystal bases exist, and what is their structure?"

In the case of quantum affine algebras without derivation (i.e., $U_q'(\mathfrak{g})$, where $\mathfrak{g}$ is of affine type), a remarkable conjecture has been made in answer to this question. Motivated by fermionic formulas arising in statistical mechanics, Hatayama, Kuniba, Okado, Tagaki, Tsuboi, and Yamada ([HKOTTY]) proposed that the Kirillov-Reshetikhin (KR) modules have crystal bases; furthermore, they conjecture that the only modules over $U_q'(\mathfrak{g})$ with crystal bases are tensor products of KR modules.

Based on the fermionic formulas, [HKOTTY] conjectured that the crystals for the KR modules should have some very special properties. In this talk we will see that these properties determine almost all of the combinatorial structure of the crystals, and in some cases the structure is completely determined. (Received September 28, 2005)