Meeting: 1003, Atlanta, Georgia, SS 23A, AMS Special Session on Representations of Lie Algebras, I

1003-16-208 **Darren R. Neubauer*** (neubauer@math.wisc.edu), 480 Lincoln Drive, Madison, WI 53706-1388. *Raising and Lowering Maps and Modules for the Quantum Affine Algebra* $U_q(\widehat{sl}_2)$.

Let $\mathbb{K}$ denote an algebraically closed field and let $q \in \mathbb{K}$ be nonzero and not a root of unity. Let V be a nonzero finite dim. vector space over $\mathbb{K}$. Let $V_0, V_1, \ldots, V_d$ be a sequence of nonzero subspaces that direct sum to V. Suppose R and L are linear maps on V such that

1. $RV_i \subseteq V_{i+1} \qquad (0 \leq i \leq d)$,
2. $LV_i \subseteq V_{i-1} \qquad (0 \leq i \leq d)$,
3. for $0 \leq i \leq d/2$, $R^{d-2i}|_{V_i} : V_i \longrightarrow V_{d-i}$ is a bijection,
4. for $0 \leq i \leq d/2$, $L^{d-2i}|_{V_{d-i}} : V_{d-i} \longrightarrow V_i$ is a bijection,
5. $R^3L - [3]R^2LR + [3]RLR^2 - LR^3 = 0$,
6. $L^3R - [3]L^2RL + [3]LRL^2 - RL^3 = 0$,

where $[3] = (q^3 - q^{-3})/(q - q^{-1})$. Let K be the linear map on V such that, for $0 \leq i \leq d$, V_i is an eigenspace for K with eigenvalue q^{2i-d}. We show there exists a unique $U_q(\widehat{sl}_2)$-module structure on V such that each of $R - e_1^-$, $L - e_0^-$, $K - K_0$, $K^{-1} - K_1$ vanish on V, where e_1^-, e_0^-, K_0, K_1 are Chevelley generators for $U_q(\widehat{sl}_2)$. We determine which $U_q(\widehat{sl}_2)$-modules arise from our construction. (Received August 27, 2004)