1058-20-206 **Brian Parshall*** (bjp8w@virginia.edu), Dept. of Mathematics, University of Virginia, Charlottesville, VA 22903, and **Leonard Scott** (lls2l@virginia.edu), Dept. of Mathematics, University of Virignia, Charlottesville, VA 22903. *Complexity of Kazhdan-Lusztig polynomials and Koszul structures.* Preliminary report.

Let $\mathfrak{g}$ be a semisimple, complex Lie algebra, and let $U_\zeta = U_\zeta(\mathfrak{g})$ be the associated (Lusztig) quantum enveloping algebra at an lth root of unity. Assume $l > h$, the Coxeter number of $\mathfrak{g}$, and that l is odd and prime to 3 if $\mathfrak{g}$ has a component of type G_2. For a dominant weight λ, let $L_\zeta(\lambda)$ be the irreducible, integrable, type 1 U_ζ-module of highest weight λ. For a fixed l-regular dominant weight λ, the sequence $\{\sum_\nu \mathrm{Ext}^n_{U_\zeta}(L_\zeta(\lambda), L_\zeta(\nu))\}_n$ has exponential growth. However, for arbitrary regular λ, ν, the sequence $\{\mathrm{Ext}^n_{U_\zeta}(L_\zeta(\lambda), L_\zeta(\nu))\}_n$ has polynomial growth in n. In this way, a complexity theory for U_ζ can be developed. This work is closely related to the theory of Kazhdan-Lusztig polynomials and to the authors' recent theorem stating that the Yoneda-algebra (without identity) $\mathbb{E} := \bigoplus_{\lambda,\nu\,\mathrm{reg}} \mathrm{Ext}^\bullet_{U_\zeta}(L_\zeta(\lambda), L_\zeta(\nu))$ is "locally Koszul," i. e., for idempotents e corresponding to saturated sets of weights, $e\mathbb{E}e$ is a finite dimensional Koszul algebra. (Received February 15, 2010)