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Spin chains as modules over the affine Temperley-Lieb algebra

Let $V = (\mathbb{C}^2)^{\otimes N}$ be the tensor product of N copies of the two-dimensional simple $U_q(\mathfrak{sl}_2)$ -module. It is also a $U_q(\mathfrak{sl}_2)$ -module (through the coproduct on $U_q(\mathfrak{sl}_2)$). The algebra of endomorphisms $\text{End}_{U_q(\mathfrak{sl}_2)} V$ is known to define a representation of the (original) Temperley-Lieb algebra TL_N on V (Jimbo (1985, 1986), Martin (1992)). This is known as the (q -)Schur-Weyl duality. The TL_N -action on V was extended to one of the affine Temperley-Lieb algebra aTL_N by two physicists in their study of spin chains (Pasquier and Saleur (1990)). While this extended action fails to commute with that of $U_q(\mathfrak{sl}_2)$, the interplay between both actions can be used to reveal the structure of V as a aTL_N -module.

This is joint work with Théo Pinet (arXiv:2205.02649).