1048-16-130 **S. Forcey*** (sforcey@tnstate.edu), **A. Lauve** and **F. Sottile**. *Polytopes, positrons, and antipodes.* Preliminary report.

The process of renormalization lets us use path integrals to calculate the precise strengths of many forces of nature, despite the suspicious subtraction of infinities. Connes and Kreimer found a way to mathematically model the process using the antipode of a graded Hopf algebra of Feynman diagrams. Their algebra turns out to be fundamental in mathematics as well as physics, as part of a larger family of algebras based on combinatorial structure. I'll show a new pictorial way of looking at that family and its inner relations. The advantage of our viewpoint is that it allows factorizations of the map from the Malvenuto-Reutanauer Hopf algebra to the Loday-Ronco Hopf algebra of binary trees.

Our factorizations proceed through new algebras based on convex polytopes such as the multiplihedra and graph-associahedra. Reading has defined translational and insertional lattice congruences which give subalgebras and subcoalgebras of the Malvenuto-Reutanauer Hopf algebra. We'll talk about how this relates to the cellular projections of polytopes between our new sequences.

If time permits we can go on to discuss multicolored versions and new Hopf modules over the algebras already introduced. (Received February 03, 2009)