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Double-dimer condensation and the dP3 Quiver

In this talk we will discuss an application of double-dimer condensation to a problem in cluster algebras, which is ongoing joint work with Tri Lai and Gregg Musiker. Double-dimer condensation is a recurrence satisfied by the partition function for double-dimer configurations of a planar bipartite graph. A similar identity for the number of dimer configurations of a planar bipartite graph was established nearly 20 years ago by Kuo.

In 2017, Lai and Musiker gave combinatorial interpretations for many toric cluster variables in the cluster algebra associated to the cone over the del Pezzo surface dP3. Specifically, they used Kuo condensation to show that most toric cluster variables have Laurent expansions agreeing with the partition functions for dimer configurations. However, in some cases, the dimer model was not sufficient. We show that in these cases, the Laurent expansions agree with partition functions for double-dimer configurations.