Categorification of Plücker formula and Rozansky-Witten theory

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Abstract.

I will discuss my recent joint works with Prof. Conan Leung and Mr. Ying Xie on the categorification of Plücker formula. Our main result – the *categorical Plüker formula* – comes from the combination of two streams of ideas: *Rozansky-Witten (RW)* theory from physics, and the *homological projective duality (HPD)* theory from mathematics. According to Rozansky-Witten theory, there should be a category associated to the intersection of two Lagrangian submanifolds inside a hyperkähler manifold, which categorifies the classical topological information (homologies, Euler characteristics, etc) of the intersection. Our main result can be viewed as showing how this category changes under *Mukai flops*. On the other hand, in algebraic geometry, Kuznetsov's HPD theory is one of the most powerful recent development in the study of derived categories. The fundamental theorem of HPD provides a systematical way to compare derived categories of linear sections of dual varieties. Mathematically, our formula generalizes the fundamental theorem of HPD theory from linear sections to general intersections. This provides a systematical way to relate derived categories of varieties which are not directly which are not directly related from classical perspective, and in particular produce new type of examples of derived equivalent Calabi-Yau manifolds that are Hodge-equivalent, deformation equivalent but non-birational equivalent to each other.