DONALDSON-THOMAS INVARIANTS AND FLOPPING CURVES

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Abstract: The Donaldson-Thomas invariants counting 1 dimensional semistable sheaves on a Calabi-Yau 3-folds are closely related to the BPS invariants coming from physics, namely the fundamental integer valued invariants that conjecturally underly all of the counting theories. These DT invariants are expected to satisfy a series of remarkable identities, among which the multiple cover formula.

   I will recall the proof of the multiple cover formula conjecture in the known cases and explain why the argument breaks in general . I will then concentrate on flopping curves. In this case it is possible to reformulate the problem using quiver representations, and upgrade the conjecture from an equality of numbers to an isomorphism of vector spaces. Finally, I will explain how in this setting a certain cohomological operator plays as substitute to the main ingredient used in the proof of the known cases, and conclude with an update on what we have proved so far using our operator.