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The Batyrev-Nill Conjecture

In the early 90s, Batyrev and Borisov provided a combinatorial construction of mirror families in toric varieties. Essentially this means pairs (X, Y) of families of Kahler manifolds such that the complex and symplectic behavior was exchanged through a duality known as mirror symmetry. However, as it turned out, this duality required certain non-canonical choices to be made, leading to examples of multiple mirrors $(X, Y_1), (X, Y_2)$ for the same X . Inspired by Kontsevich's homological mirror symmetry conjecture, Batyrev and Nill conjectured that these multiple mirrors were related through birational geometry and the derived category. I will talk about the Batyrev-Borisov construction, give some examples of this phenomenon and explain the theorem of myself and Tyler Kelly proving the Batyrev-Nill conjecture.