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Hodge-elliptic genera and how they govern K3 theories

In this talk, we review the complex elliptic genus of Calabi-Yau manifolds, along with a number of refinements, called Hodge-elliptic genera, some of which were introduced recently by Kachru and Tripathy. We discuss some properties of these new invariants, in particular for K3 surfaces. Moreover, without assuming background knowledge from conformal field theory, we explain the role of these invariants for a certain type of superconformal field theories, called K3 theories.