Geometric Classification of 5d SCFTs at Fixed Rank

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The subject of this poster is recent progress on classifying 5d SCFTs with Coulomb branch deformations, building on the insight that M-theory compactified on a smooth Calabi-Yau threefold is described at low energy by a 5d $\mathcal{N} = 1$ gauge theory. On the field theory side, we use the rich interplay between Calabi-Yau geometry and 5d $\mathcal{N} = 1$ supersymmetry to propose a new set of field theoretic criteria necessary for a simple gauge theory to admit a UV fixed point. We then discuss a purely geometric classification program for rank one and two theories which sharpens the necessary field theoretic criteria by accounting for nonperturbative instanton physics. This geometric classification program confirms the existence of almost all new theories identified using the field theoretic approach (while excluding some special cases), predicts several dualities among these theories, and further supports the idea that all 5d SCFTs can be viewed as deformations of a 6d "parent" theory compactified on a circle.