Discrete Gaugings and Anomalies

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Abstract:

In these lectures we will provide a systematic and (hopefully) pedagogical introduction to gauging discrete symmetries of 4d super-conformal field theories (SCFTs) preserving different amount of Supersymmetry. An analysis of anomalies of these symmetries will also be provided. We will start our analysis from N = 4 field theories. We systematically analyze the symmetries of these theories and discuss in details the conditions that must be satisfied in order to preserve at least 12 of the initial 16 super-charges. In the simplest cases, when the discrete subgroup that we are gauging is isomorphic to the Z 2 charge conjugation symmetry, this gauging leads to new N = 4. Some of these new N = 4 theories present novel and interesting features of their moduli space of vacua which will also be discussed. In the more general case, when the discrete subgroup is isomorphic to Z n (with n = 3,4,6), the gauging leads to new 4d N = 3 non-Langrangian SCFTs. We will briefly conclude analyzing gauging discrete symmetries for general N = 2 SCFTs. The analysis of anomalous discrete symmetries of field theories in different dimensions, has received a lot of attention recently. We will briefly review the main findings of this vast topic and then quickly move to the supersymmetric case and to the analysis of the discrete symmetries discussed above. We will outline a program to check for their anomalies which involve an analysis of the twisted partition function on general four-manifolds.