

4D Gauge Theories with Conformal Matter

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Abstract

One of the hallmarks of 6D superconformal field theories (SCFTs) is that on a partial tensor branch, all known theories resemble quiver gauge theories with links comprised of 6D conformal matter, a generalization of weakly coupled hypermultiplets. In this paper we construct 4D quiverlike gauge theories in which the links are obtained from compactifications of 6D conformal matter on Riemann surfaces with flavor symmetry fluxes. This includes generalizations of super QCD with exceptional gauge groups and quarks replaced by 4D conformal matter. Just as in super QCD, we find evidence for a conformal window as well as confining gauge group factors depending on the total amount of matter. We also present F-theory realizations of these field theories via elliptically fibered Calabi-Yau fourfolds. Gauge groups (and flavor symmetries) come from 7-branes wrapped on surfaces, conformal matter localizes at the intersection of pairs of 7-branes, and Yukawas between 4D conformal matter localize at points coming from triple intersections of 7-branes. Quantum corrections can also modify the classical moduli space of the F-theory model, matching expectations from effective field theory.