Deconfined quantum critical points: symmetries and dualities
CHONG WANG, Harvard Univ, ADAM NAHUM, MAX METLITSKI, Massachusetts Institute of Technology, CENKE XU, University of California, Santa Barbara, T. SENTHIL, Massachusetts Institute of Technology — The deconfined quantum critical point (QCP) between the Neel and the valence bond solid (VBS) phases was proposed as an example of $(2+1)d$ conformal field theories that are fundamentally different from all the standard Landau-Ginzburg-Wilson-Fisher fixed points. In this work we demonstrate that the deconfined QCP, both the easy-plane version and the version with an explicit SU(2) spin symmetry, have multiple equivalent descriptions. In particular, the easy-plane deconfined QCP, besides its self-duality that was discussed before, is also dual to the $N_f = 2$ fermionic quantum electrodynamics (QED), which has its own self-duality and hence has an O(4)$\times Z_2^T$ symmetry; the deconfined QCP with the explicit SU(2) spin symmetry is dual to the $N_f = 2$ QED-Gross-Neveu fixed point, and could have an emergent SO(5) symmetry, as was conjectured before.

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