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Thermodynamics of SU(4) gauge theory with fermions in multiple representations

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We study the phase structure of SU(4) gauge theory with dynamical quarks in both the fundamental and two-index antisymmetric representations. Such "multi-representation" theories have been speculated to exhibit separated phase transitions, but our lattice calculations suggest the existence of only a single thermal phase transition: both species of fermion appear to confine and break chiral symmetry simultaneously. We investigate the order of the combined phase transition in various limits of the theory, and compare to theoretical expectations based on chiral symmetry.

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