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Symmetry, Confinement, and the Higgs Phase

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We point out a distinction, in gauge theories with matter in the fundamental representation, between color confinement and a stronger version of confinement, which we call “separation of charge” confinement. The latter is a generalization of the Wilson area-law criterion to gauge+matter theories. In gauge-Higgs theories, we show that the transition (which is not necessarily a thermodynamic transition) between separation-of-charge confinement and color confinement coincides with the spontaneous breaking of a certain global symmetry in the Higgs sector, known as custodial symmetry.

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