# Hamiltonian formulations without and with strings for electric and magnetic charges

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We give noncanonical (without string) and canonical (with string) Hamiltonian formulations for a system of classical electric and magnetic charges. We do not introduce potentials in either case. This allows us to see very clearly the necessity of and the role played by the string in a canonical formalism. The ten generators of the Poincaré group are explicitly shown. However, "proof" of the relativistic covariance of the canonical formulation is based on the highly singular equation defining the string. The quantum theory associated with our canonical description is the Schwinger field theory. © 1976 The American Physical Society.