Abstract Submitted
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A General Theory for Gauge-Free Lifting[1] P.J. MORRISON, The University of Texas at Austin — Given a Hamiltonian set of orbit equations, defined on a phase space of arbitrary dimension, with 'forces' that depend explicitly on given electric and magentic fields and possibly all of their derivatives, how does one lift to a Hamiltonian kinetic theory coupled to Maxwell's equations? A general theory that answers this question will be presented. The theory produces magnetization and polarization effects in Maxwell's equations via a Poisson bracket that generalizes that for the Vlasov-Maxwell system.[2] Several examples will be treated, including the generalized guiding-center kinetic theory of Pfirsch and the author,[3] which relies on the introduction of redundant variables via Dirac constraint theory, and a theory that incorporates spin in the Vlasov context.[4]

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[2]P.J. Morrison, Phys.Lett. **80A**, 383 (1980); AIP Conference Proceedings **88**, 13 (1982).
[3]D. Pfirsch and P.J. Morrison, Phys. Rev. **32A**, 1714 (1985); Phys. Fluids **3B**, 271 (1991).
[4]M. Marklund and P.J. Morrison, Phys. Lett. **375A**, 2362 (2011).

Phiip Morrison
The University of Texas at Austin

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