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Poisson-bracket formulation of the dynamics of polar liquid crystals[1] WILLIAM KUNG, M. CRISTINA MARCHETTI, Syracuse University, KARL SAUNDERS, California Polytechnic State University — We develop the dynamical theory of polar liquid crystals with local $C_{\infty v}$-symmetry using the general Poisson-bracket formalism. We obtain dynamical equations for the slow macroscopic fields that govern the dynamics in both the polarized and the isotropic phases. Starting from a microscopic definition of an alignment vector proportional to the polarization, we obtain Poisson bracket relations for the director field. The hydrodynamic equations differ from those of nematic liquid crystals ($D_{\infty h}$) in that they contain terms violating the $\mathbf{n} \to -\mathbf{n}$ symmetry. We find that the $\mathcal{Z}_{\in}$-odd terms induce a general splay instability of a uniform polarized state in a range of parameters.

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