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Modulated liquid-crystal phases induced by polarity: Twist-bend, splay-bend, and blue phases[1] JONATHAN SELINGER, SHAIKH SHAMID, DAVID ALLENDER, Kent State University — Nematic liquid crystals exhibit flexoelectric couplings between polar order and gradients in the director field. When the couplings become strong enough, the uniform nematic phase can become unstable to the formation of a modulated polar phase. The question is then: What is the structure of the modulated polar phase? Classic work by Meyer and further studies by Dozov predicted two possible structures, known as twist-bend and splay-bend. One of these predictions, the twist-bend phase, has recently been identified in experiments on bent-core liquid crystals. Here, we investigate modulated polar phases through a combination of Landau theory and lattice simulations. We find a range of possibilities, including the twist-bend and splay-bend phases as well as polar blue phases, with 2D or 3D modulations of the director field and the polar order. We compare these polar blue phases with chiral blue phases, and discuss opportunities for observing them experimentally.

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