Chiral symmetry breaking in coexistence phase: How nematic lyotropic chromonic liquid crystals twist to accommodate sessile isotropic droplets

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Confined lyotropic chromonic liquid crystals (LCLCS) often show chiral symmetry breaking because of their very small twist elastic moduli and unprecedentedly large saddle-splay elastic moduli. In this work, we introduce another chiral-symmetry-breaking experiment utilizing nematic-isotropic coexistence phase. By controlling the temperature of the homeotropic cells of nematic Sunset Yellow, we make isotropic droplets of a spherical-cap shape to nucleate on a flat surface. In the coexistence phase, the nematic directors align around the isotropic droplets with a planar anchoring resulting in a point defect called a boojum. They exhibit twisted-radial textures with either right- or left-handedness. We propose a director field model explaining the energetics of this chiral symmetry breaking where the boojums play a critical role. We also investigate the effect of a chiral dopant on the chiral symmetry breaking.