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Uniaxial symmetry and 'biaxial escape' in nematic liquid crystals

In nematics, molecules tend to align in some preferred direction. The local alignment may be biaxial, or present uniaxial symmetry. It has long been predicted that 'biaxial escape' should occur in some particular regimes. We will present some new insight on the uniaxiality constraint, independently of the regime. We also present a rigorous proof of 'biaxial escape' in the low temperature regime (joint work with A. Contreras).