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Ring defects in Liquid Crystals

I will present some mathematical analysis of defects in liquid crystals, using their close relationship with the study of singularities for harmonic maps due to topological constraints. I will present the physically fundamental problem of describing the defects created by immersing a colloid particle in a nematic liquid crystal, and present recent results using the Landau-de Gennes energy. We find that the Landau–de Gennes model allows for a greater variety of types of singularity than the (harmonic map-based) Oseen–Frank energy, including line singularities such as the "Saturn Ring" defect.

This work is joint with S. Alama, D. Golovaty and X. Lamy.