

INDICAZIONI AI CANDIDATI PER LA STESURA DEL PROGETTO DI RICERCA DI CUI ALL'ART. 4 COMMA 11 LETT. F) DEL BANDO DI CONCORSO

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Toroidal nematics are drops of nematic liquid crystals produced in a toroidal shape. Under appropriate solvent conditions, such exotic shapes have already been observed experimentally in DNA condensates, which have been successfully analyzed with liquid crystal theory. It is known that in this geometry the untwisted equilibrium configuration for the nematic optic axis can undertake a spontaneous chiral symmetry breaking, giving rise to two equally probable twisted configurations with opposite chirality. It is the aim of this project to try and see whether optimization methods for deep learning can identify and characterize these chiral equilibrium states and the optical properties that have the potential to make them discernable. The successful candidate should indicate in their project a viable, tentative avenue to accomplish this task.

BIBLIOGRAPHY

- [1] V. Koning, B. C. van Zuiden, R. D. Kamien and V. Vitelli, Saddle-splay screening and chiral symmetry breaking in toroidal nematics, *Soft Matter*, 10 (2014), 4192.
- [2] F. E. Curtis and K. Scheinberg, *Optimization Methods for Supervised Machine Learning: From Linear Models to Deep Learning*, arXiv:1706.10207, 2017.