Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Dynamics of point defects in free-standing smectic films[1]
KIRSTEN HARTH, RALF STANNARIUS, Otto-von-Guericke University Magdeburg — Ordering phenomena that break certain symmetries often involve the dynamics of defects. In liquid crystals, such processes are easily visualized in polarized light microscopy. Point defect annihilation has been investigated experimentally and numerically in thermotropic nematics, lyotropics and active nematics. Free-standing smectic films are ideal model systems to probe two-dimensional hydrodynamics. Films in the smectic C phase represent the simplest anisotropic fluid in two dimensions. Within elastic one-constant approximation and neglect of hydrodynamic effects, the description of defect dynamics is identical to that of point charges in electrodynamics. Whereas the equations for two point charges are easily solvable analytically, the case of three or more charges is equivalent to the classical three-body problem. We present new methods to create defect pairs and groups of defects of topological strength +1 in a controlled way. The annihilation process, the repulsion of sets of +1 defects in several geometrical configurations, and repulsion of +1 defects from larger positive net topological charges are analyzed. We discuss the influence of material flow and compare the experimental results to theory and simulations.

[1]The German Science Foundation (DFG) is acknowledged for funding within Grant STA 425/28.

Kirsten Harth
Otto-von-Guericke University Magdeburg

Date submitted: 15 Nov 2013 Electronic form version 1.4