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Theory of "scar" defects in liquid-crystalline films[1] JONATHAN V. SELINGER, ZHAO LU, Liquid Crystal Institute, Kent State University — Recently, several researchers have studied crystalline order on the surface of a sphere, both theoretically [1] and experimentally [2]. In this system, one might expect to see twelve point disclinations, as required by topology. Instead, they find that the point disclinations extend into "scar" defects, which are finite grain boundaries. Our goal is to determine how general is the phenomenon of scar formation. Does it require crystalline order, and does it require curvature? For that reason, we investigate an xy model in a flat disk geometry, where boundary conditions require a total topological charge of +1, i.e. the vector order parameter must rotate through a total angle of 2π. In the classical xy model, the ground state would have a single vortex of charge +1. However, for certain slight variations on the xy model, the ground state has a scar defect, which looks like two vortices of charge +1/2 connected by an orientational domain wall. The formation of scars depends on details of the interaction energy in a lattice or continuum system. We discuss possible opportunities to observe these scar defects in experiments. [1] M. J. Bowick et al., *Phys. Rev. B* **62**, 8738 (2000). [2] A. R. Bausch et al., *Science* **299**, 1716 (2003).

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