Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Information geometry and phase transitions of fluids with global anomalies PIOTR SUROWKA, Harvard University — Fluid helicity is an important observable that captures topological properties of hydrodynamics. It naturally emerges in the context of parity-breaking fluids with knotted vortex lines. If the fluid constituents exhibit quantum anomalies the topological nature of fluid helicity can be elucidated using microscopic physics. In this case the helicity is given by a polynomial function of temperature and chiral chemical potential and completely fixed by the anomalies. We explain this relation and address the question of phase structure of such fluids using methods of information geometry. We introduce the metric on a parameter space and show that a non-zero vorticity leads to a curvature on the statistical manifold. We calculate the curvature invariant and analyze its divergences, which contain the information about phase transitions of the system. The transition points are universal and expressed in terms of ratios of anomaly coefficients.

Piotr Surowka
Harvard University

Date submitted: 31 Jul 2015 Electronic form version 1.4