

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Hamiltonian Formulation of the Hydrodynamics with Quantum Anomalies** GUSTAVO MONTEIRO, ALEXANDER ABANOV, Stony Brook University — The hydrodynamic limit of a charged massless chiral spinor under the presence of gauge field in 3 dimensions is considered in [1]. For this system, global gauge symmetry is anomalous. In order to satisfy the second law of thermodynamics, charge current and entropy flow have to be corrected. We present a Hamiltonian formulation of the relativistic hydrodynamics which accounts for these new terms; extending the analysis done in [2]. In this formulation, the limit when particles become massless can be performed in a straightforward way and it has the advantage of being the natural framework to quantization. We show that the Poisson's structure of the hydrodynamics of ideal relativistic fluid allows for a one-parameter deformation. The value of the parameter is fixed by quantum anomalies present in the underlying theory. This formulation allows for generalizations to hydrodynamics of systems with additional conserved quantities, and is found to be a higher dimensional analogue to quantum hall effect. [1] D.T. Son and P. Surowka, Phys.Rev.Lett. 103, 191601 (2009). [2] D.D. Holm and B.A. Kupershmidt, Phys Lett. 101A, 23 (1984)

Luana Pedroza  
Stony Brook University

Date submitted: 09 Nov 2012

Electronic form version 1.4