Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

**Superconducting Froth**[1] RUSLAN PROZOROV, ANDREW F. FIDLER, JACOB HOBERG, PAUL C. CANFIELD, Ames Laboratory, Ames, IA 50011 — Studying the structure and dynamics of froths helps to understand the behaviour of complex systems where topological intricacy prohibits exact evaluation of the ground state. Though exact solutions are difficult, general laws that take into account both, the topological constrains and physics and chemistry of the froth matter have been developed. We used low temperature magneto-optical imaging in superconducting lead to add a new member to the froths family, - superconducting quantum froth, in which the boundaries are the superconducting and the interior is the normal phase. Despite very different microscopic origin, the topological analysis of the structure has shown that von Neumann's and Lewis' laws apply. Furthermore, for the first time in the froths analysis there is an external global parameter of known behaviour - the total magnetic moment. We show that the statistical laws are in a good agreement with the predicted macroscopic response. We assert that superconducting froth is the new playground for the analysis of complex physics of froths with magnetic field and temperature as tuneable control parameters.

[1]Supported by the DOE-BES (contract No. DE-AC02-07CH11358) and Alfred P. Sloan Foundation

Ruslan Prozorov
Ames Laboratory, Ames, IA 50011

Date submitted: 07 Nov 2007 Electronic form version 1.4