Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Avalanches and hysteresis in frustrated superconductors and XY spin-glasses AUDITYA SHARMA, International Institute of Physics - Federal University of Rio Grande do Norte, Natal, RN, Brazil, ALEXEI ANDREANOV, Max-Planck Institute for Physics of Complex Systems, Dresden, MARKUS MUELLER, The Abdus Salam ICTP, Trieste, Italy — We study avalanches along the hysteresis loop of long-range interacting spin-glasses with continuous XY symmetry - which serves as a toy model of granular superconductors with long-range and frustrated Josephson couplings. We identify sudden jumps in the $T = 0$ configurations of the XY phases, as an external field is increased. They are initiated by the softest mode of the inverse susceptibility matrix becoming unstable, which induces an avalanche of phase updates (or spin alignments). We analyze the statistics of these events, and study the correlation between the no n-linear avalanches and the soft mode that initiates them. We find that the avalanches follow the directions of a small fraction of the softest modes of the inverse susceptibility matrix, sim ilarly as was found in avalanches in jammed systems. In contrast to the similar Ising spin-glass (Sherrington-Kirkpatrick) studied previously, we find that avalanches are not distributed with a scale-free power law, but rather have a typical size which scales with the system size.

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Date submitted: 15 Nov 2013 Electronic form version 1.4