Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

The quantum effective potential and the condensation of topological excitations in Josephson junction arrays. SAID SAKHI, College of Arts and Sciences, American University of Sharjah, PO Box 26666, Sharjah,UAE — I analyze the radiative corrections to the effective potential for an Abelian gauge theory relevant to Josephson junction arrays (JJA). This model consists of two disorder fields related to electric and magnetic charges coupled to topologically gauge fields described by Maxwell terms and a mixed Chern-Simons term. The symmetry of the ground state is studied through the effective potential which takes into account radiative corrections in the theory. Here zero condensates for the topological charge excitations describe [1] insulating phases of JJA, and nonzero condensates describe superconducting phases. The gauge fields contribution to the one-loop effective potential is evaluated and its effect on the spontaneous symmetry breaking is examined. Effects of dissipation driven coupling in JJA systems connected to a reservoir of gapless single-particle excitations are also studied. Coupling to gapless fermions is shown to induce radiative corrections in the effective potential which favor transitions between an insulating state and a superconducting state. [1] S. Sakhi, Europhys. Lett. 73 (2), 267 (2006).

Said Sakhi
College of Arts and Sciences, American University of Sharjah,
PO Box 26666, Sharjah,UAE

Date submitted: 02 Dec 2008 Electronic form version 1.4