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**Steady States of the Inhomogenous Microwave Irradiated Quantum Hall Gas** ASSA AUERBACH, Technion, ILYA FINKLER, Harvard University, BERTRAND HALPERIN, Harvard University, AMIR YACOBY, Weizmann Institute — To explain the observation of Zero-Resistance states (ZRS) in Microwave irradiated Quantum Hall gases[1], it has been proposed[2] that under appropriate conditions the sample will break into domains of photogenerated fields. In the absence of disorder induced pinning, motion of domain walls results in a ZRS state. In order to treat the effects of long wavelength disorder, we construct a Lyapunov functional for systems with uniform Hall conductivity. We use it to derive stability conditions on the domain structure and to compute the conductance. We show that weak white noise disorder does not destroy the ZRS although it produces current fluctuations. In contrast, separable and correlated disorder pin the domain walls, and produce a finite conductance and a photovoltage as demonstrated by one dimensional, and simple two dimensional, potentials.

1. R.G. Mani et.al. Nature, 420, 646 (2002); M.A. Zudov et.al., Phys. Rev. Lett. 90, 046807 (2003).
2. A.V. Andreev, I.L. Aleiner, and A.J. Millis, PRL 91, 056803 (2003).

Assa Auerbach  
Technion

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