Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Branched flow and caustics in random media with magnetic fields
JAKOB METZGER, RAGNAR FLEISCHMANN, THEO GEISEL, Max-Planck-Institute for Dynamics and Self-Organization and University of Goettingen, Germany — Classical particles as well as quantum mechanical waves exhibit complex behaviour when propagating through random media. One of the dominant features of the dynamics in correlated, weak disorder potentials is the branching of the flow. This can be observed in several physical systems, most notably in the electron flow in two-dimensional electron gases [1], and has also been used to describe the formation of freak waves [2]. We present advances in the theoretical understanding and numerical simulation of classical branched flows in magnetic fields. In particular, we study branching statistics and branch density profiles. Our results have direct consequences for experiments which measure transport properties in electronic systems [3].

[1] e.g. M. A. Topinka *et al.*, Nature **410**, 183 (2001), M. P. Jura *et al.*, Nature Physics **3**, 841 (2007)
[2] E. J. Heller, L. Kaplan and A. Dahlen, J. Geophys. Res., **113**, C09023 (2008)
[3] J. J. Metzger, R. Fleischmann and T. Geisel, *in preparation*

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Date submitted: 10 Dec 2008 Electronic form version 1.4