Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Probing Localization in Scattering Systems via Fidelity MEI CHAI ZHENG, Dept. of Physics, JOSHUA BODYFELT, Dept. of Physics, Wesleyan University, ULRICH KUHL, HANS-JUERGEN STOECKMANN, Fachbereich Physik der Phillips–Universitaet Marburg, TSAMPIKOS KOTTOS, Max Planck Institute for Dynamics & Self-Organization. AND Dept. of Physics, Wesleyan University, DEPT. OF PHYSICS, WESLEYAN UNIVERSITY COLLABORATION, FACHBEREICH PHYSIK DER PHILLIPS–UNIVERSITAET MARBURG COLLABORATION, MAX PLANCK INSTITUTE FOR DYNAMICS & SELF-ORGANIZATION COLLABORATION — Using scattering measurements from a microwave cavity filled with randomly distributed scatterers, we evaluate the scattering fidelity. We show that depending on the degree of localization inside the sample, the fidelity decay deviates from "traditional" Gaussian law, applied in the case of diffusive/chaotic cavities when small perturbations are involved. We instead show that for small displacements of one of the walls of the cavity, the fidelity decays in a novel way that reflects the degree of localization (or randomness) inside the cavity. The outcome of the experimental measurements are explained on the basis of a parametric Banded Random Matrix modeling which incoorporates localization phenomena. The theoretical results are in good agreement with those of the experiment.

Mei Chai Zheng
Dept. of Physics, Wesleyan University

Date submitted: 23 Nov 2008 Electronic form version 1.4