Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Radiation of complex and noisy sources within enclosures[1]
GABRIELE GRADONI, STEPHEN CREAGH, GREGOR TANNER, University of Nottingham — Predicting the radiation of complex electromagnetic sources inside semi-open cavities and resonators with arbitrary geometry is a challenging topic both for physics and for engineering. We have exploited a Perron-Frobenius operator to propagate field-field correlation functions of complex and extended sources in free-space. The formula is based on a phase-space picture of the electromagnetic field, using the Wigner distribution function, and naturally captures evanescent as well as diffracted waves. This approach can be extended to study the propagation of correlation functions within cavities, with the ray-dynamical map given by the geometry of the cord connecting a point of the boundary to another. While ray methods provide an efficient way to predict average values of the correlation matrix elements, the use of random matrix theory approaches allows efficient characterisation of statistical fluctuations around these averages. Universal relations are derived and tested in the presence of dissipation for quantum maps and billiard systems. The use of this formalism is discussed in the contexts of open systems with surface roughness. The theory and achieved results are of interest in the simulation of next-generation of wireless communications.

[1]Work supported by the UK Engineering and Physical Sciences Research Council

Gabriele Gradoni
University of Nottingham

Date submitted: 06 Nov 2015 Electronic form version 1.4