Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Solving a puzzle in the Anderson transition with long-range correlated potentials[1] GREG PETERSEN, NANCY SANDLER, Ohio University — The conditions for an Anderson transition in 1D systems has been an open question since it's discovery a half century ago. Although scaling theory predicts localization in this case, it has been shown that a transition exists in the presence of some form of long-range correlations in the on-site energies. One of the most widely used examples are disorder potentials generated by $1/k^{\alpha}$ spectral densities [1] that, with an appropriate short range cutoff, result in vanishing correlation functions in the thermodynamic limit. However, these results are in direct contradiction to work by Kotani et. al. [2] that argues for the existence of a metallic state only when infinite range correlations are non-zero. In this talk we will show that there is no contradiction between the two results as the correlation function generated from numerical techniques is staunchly different from analytic expectations. Furthermore, we will present the exact analytic expression for the correlation function in the thermodynamic limit. Finally, we will discuss the role played by short- and long-range features of the correlation function in the Anderson transition.

[1] F. Moura and M. Lyra, PRL **81**, 3735 (1998)
[2] S. Kotani and B. Simon Commun. Math. Phys. **112**,103 (1985).

[1]Supported by NSF-MWN/CIAM and NSF-PIRE.

Greg Petersen
Ohio University

Date submitted: 17 Nov 2012 Electronic form version 1.4