1086-35-1278 **N. Benjamin Murphy** and **Kenneth M. Golden*** (golden@math.utah.edu), University of Utah, Department of Mathematics, 155 S 1400 E, Rm. 233, Salt Lake City, UT 84112-0090.

Random Matrices, Spectral Measures, and Composite Media.

We consider disordered heterogeneous media which arise in a broad range of applications and display structure on many length scales. Examples include random resistor networks, porous bone, the brine microstructure of sea ice, ocean eddy fields, melt ponds on the surface of Arctic sea ice, and the polar ice packs themselves. The analytic continuation method provides a rigorous approach to treating the effective properties of such systems. At the heart of this method is a random matrix which depends only on the composite geometry. In this lecture we will discuss computations of the spectral measures of this operator which yield effective transport properties, as well as statistical measures of its eigenvalues. In particular, the effective properties often exhibit large changes associated with transitions in the connectedness of a particular phase. These transitions are reflected in the behavior of the spectral measures and in the long and short range correlations of the eigenvalues of the underlying random matrices. In the case of sea ice, these results provide greater insight into the polar marine environment and the role of sea ice in climate change. (Received September 20, 2012)