

ON THE SPECTRAL THEORY OF 1-D
SCHRÖDINGER OPERATOR WITH SPARSE
RANDOM POTENTIALS

Thomas A. Cook

Preprint no. 2019-04

Abstract

The goal of this dissertation is to develop a spectral theory for the Schrödinger operator with sparse random potential. To do this, we will first reformulate theories for sparse deterministic potentials. This includes a general development of the spectral measure μ and the use of a generalized Fourier transform for the development of μ will also be discussed. The interpretation would be that the support of μ is the spectrum Σ . The development of a unitary operator known as the monodromy operator will be discussed as well as the fascinating connection to the spectrum of the Schrödinger operator. We will construct an example to show that for sparse potentials the Bargmann estimate is too “rough” of an estimate for the number of negative eigenvalues. Lastly, we will show that there is a spectral transition from singular continuous to pure point spectrum of certain Schrödinger operators with random sparse potentials.