ANDERSON TRANSITION AT 2 DIMENSIONAL GROWTH RATE FOR THE GRAPH WITH COMPLETE CONNECTIONS BETWEEN ADJACENT SHELLS

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ABSTRACT. We consider the following graph: The graph vertices consist of countably many finite sets, $S_0, S_1, ...$ consisting of $s_0, s_1, ...$ elements where s_n is any sequence of positive integers. We connect each point in S_n with each point in S_{n+1} and normalize the weight of the edge by $1/\sqrt{s_n s_{n+1}}$ and let A be the corresponding weighted adjacency operator. The set S_0 can be considered as set of roots and S_n is the set of vertices of graph distance n. Therefore, we say the graph has d-dimensional growth rate if $s_n \sim n^{d-1}$, and it has at least d-dimensional growth rate if $s_n > cn^{d-1}$. The d-dimensional growth is uniform if s_n/n^{d-1} has a positive limit as $n \to \infty$. We consider the Anderson model given by $A + \lambda V$ where V is an i.i.d. compactly supported potential. For small disorder, in a certain energy region the spectrum is purely absolutely continuous if the volume growth is at least d dimensional for $d > 2$ and it is pure point if the volume growth is uniform d-dimensional for any $d < 2$. At uniform 2-dimensional growth rate an energy region with singular continuous spectrum appears. The special structure of the graph allows a description with transfer matrices, it can be seen as a hybrid between one and multi-dimensional graphs.