1077-70-1960 **Dan Li*** (dli@math.fsu.edu), 208 Love Building 1017 Academic Way, Tallahassee, FL 32306.
The algebraic geometry of Harper operators.

Following an approach developed by Gieseker, Knörrer and Trubowitz for discretized Schrödinger operators, we study the spectral theory of Harper operators in dimension two and one, as a discretized model of magnetic Laplacians, from the point of view of algebraic geometry. We describe the geometry of an associated family of Bloch varieties and compute their density of states. Finally, we also compute some spectral functions based on the density of states.

We discuss the difference between the cases with rational or irrational parameters: for the two dimensional Harper operator, the compactification of the Bloch variety is an ordinary variety in the rational case and an ind-pro-variety in the irrational case. This gives rise, at the algebro-geometric level of Bloch varieties, to a phenomenon similar to the Hofstadter butterfly in the spectral theory. In dimension two, the density of states can be expressed in terms of period integrals over Fermi curves, where the resulting elliptic integrals are independent of the parameters.

In dimension one, for the almost Mathieu operator, with a similar argument we find the usual dependence of the spectral density on the parameter, which gives rise to the well known Hofstadter butterfly picture. (Received September 21, 2011)