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Expander families and variation of Galois representations

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Abstract: Given a pair of curves U, V over the complex numbers, one can associate to a finite unramified map $V \rightarrow U$ a finite Cayley-Schreier graph. In this talk we consider families of maps $V_i \rightarrow U$ indexed by a parameter i such that the family of associated graphs is an expander family. As we will explain, the expander hypothesis has remarkable geometric implications, e.g. the set of V_i such that the gonality of V_i is less than your favorite positive number N is finite. We will also explain some of the arithmetic implications, e.g. for all but finitely many V_i , there are only many points on V_i defined over some extension of K of degree at most N . As one an application, we can derive results on the variation of Galois representations in a one-parameter family of abelian varieties defined over a number field.

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