Global hypoellipticity for a family of sums of squares operators

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In this lecture we present a necessary and sufficient condition for a family of sums of squares operators to be globally hypoelliptic on a torus. This condition says that either a Diophantine condition is satisfied or there exists a point of finite type. Also, we describe the analytic and Gevrey versions of this result. The proof is based on L^2-estimates and microlocal analysis.