1125-11-499 **Paul Savala*** (psavala@whittier.edu). *Computing the Laplace Eigenvalue and Level of Maass Cusp Forms.*

Let f be a primitive Maass cusp form for a congruence subgroup $\Gamma_0(D) \subset \mathrm{SL}(2,\mathbb{Z})$ and $\lambda_f(n)$ its n-th Fourier coefficient. In this talk we discuss a recent paper by the author which shows that with knowledge of only finitely many $\lambda_f(n)$ one can often solve for the level D, and in some cases, estimate the Laplace eigenvalue to arbitrarily high precision. This is done by analyzing the resonance and rapid decay of smoothly weighted sums of $\lambda_f(n)e(\alpha n^\beta)$ for $X \leq n \leq 2X$ and any choice of $\alpha \in \mathbb{R}$, and $\beta > 0$. The methods include the Voronoi summation formula, asymptotic expansions of Bessel functions, weighted stationary phase, and computational software. These algorithms manifest the belief that the resonance and rapid decay nature uniquely characterizes the underlying cusp form. They also demonstrate that the Fourier coefficients of a cusp form contain all arithmetic information of the form. (Received September 04, 2016)