1086-57-945 **Brian A. Benson*** (benson9@illinois.edu), University of Illinois, Department of Mathematics, 1409 W. Green Street, Urbana, IL 61801. *Buser's Inequality and Cheeger Constants of Arithmetic Surfaces.*

Ian Agol recently gave an approach for improving the sharpness of Buser's inequality for compact n-manifolds M, which gives an upper bound for the Cheeger constant of M, $h(M)$, in terms of the first non-zero eigenvalue of the Laplacian of M, $\lambda_1(M)$. A difficulty of Agol's method is that it is given implicitly by a collection of equations, one of which is an ODE. Agol's equations are simplest for $n = 3$, and he used his approach to substantially improve Buser's inequality in that dimension. In recent work, I find the general solution to Agol's ODE for arbitrary n. I will then discuss how Agol's refinement of Buser's inequality can be extended from compact surfaces to any hyperbolic surface with finite area. Selberg's one-quarter conjecture considers a specific sequence of arithmetic surfaces $X(N)$ and speculates that $\lambda_1(X(N)) \leq 1/4$. As an application, using a result of Brooks and Zuk, we show that Selberg's conjecture one quarter conjecture implies that $h(X(N))$ is bounded in a fixed interval of length less than $1/5$ for all but finitely many N. (Received September 16, 2012)