

9

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

School of Mathematics

28 July, 2017

MATHEMATICS COLLOQUIUM

Sugata Mondal from Indiana University, Bloomington, will speak on

‘Small Eigenvalues of Riemannian surfaces’

at 04.00 p.m. on Thursday, 03 August, 2017 in the **Lecture Room (AG-69)** of the Institute.


Vivek Vengurlekar

Abstract

Any eigenvalue of the Laplace operator, acting on the function space of a hyperbolic surface S , below $1/4$ is called a *small or exceptional* eigenvalue of S . Historically, Selbergs $1/4$ -conjecture was a motivation for the study of these eigenvalues. Existence of hyperbolic surfaces having small eigenvalues was first obtained by B. Randol (1974, [Ra]). Later P. Buser found a simpler construction of such surfaces (1977, [Bu]). He also found initial bounds on the number of small eigenvalues of a given surface depending on the topology of the surface (1977, [Bu]).

Later P. Schumtz (1991, [Sch]) sharpened the methods developed by Buser and from his bounds he (and later Buser also) conjectured that the number of these eigenvalues of a closed hyperbolic surface is at most the Euler characteristic of the surface. An extended version of this conjecture was proved by Otal and Rosas (2009, [OR]). In their paper Otal-Rosas asked if their result can be extended to all smooth surfaces. In a series of three papers [BMM1], [BMM2] and [BMM3], joint with Werner Ballmann and Henrik Matthiesen, we have answered an extended version of this last question in the affirmative. In this talk I shall present a short survey of these developments and results.

References

- [BMM1] W. Ballmann, H. Matthiesen, S. Mondal, Small eigenvalues of closed surfaces. *J. Differential Geom.* 103 (2016), no. 1, 113, MR3488128, Zbl 1341.53066.
- [BMM2] W. Ballmann, H. Matthiesen, S. Mondal, Small eigenvalues of surfaces of finite type. *Compositio Math.* 153 (2017), 17471768, MR, Zbl.
- [BMM3] W. Ballmann, H. Matthiesen, S. Mondal, On the analytic systole of Riemannian surfaces of finite type. (submitted).
- [Bu] P. Buser, Geometry and spectra of compact Riemann surfaces. Reprint of the 1992 edition. Modern Birkhuser Classics. Birkhuser, 2010. xvi+454 pp., MR2742784, Zbl 1239.32001.
- [OR] J.-P. Otal, E. Rosas, Pour toute surface hyperbolique de genre g , $\lambda_{2g-2} > 1/4$. *Duke Math. J.* 150 (2009), no. 1, 101115, MR2560109, Zbl 1179.30041.
- [Ra] B. Randol Small eigenvalues of the Laplace operator on compact Riemann surfaces. *Bull. Amer. Math. Soc.* 80 (1974), 9961000.
- [Sch] P. Schmutz, Small eigenvalues on Riemann surfaces of genus 2. *Invent. Math.* 106 (1991), no. 1, 121138, MR1123377, Zbl 0764.53035.

Copy to : General Administration : Canteen Manager : Notice Boards
--