

Master's thesis proposal

Systoles of Riemann surfaces and their Jacobians

Supervisor: S. Sabourau (Tours)

A Riemann surface and its Jacobian are two related geometrical objects: one is a surface endowed with a hyperbolic metric while the other is a flat torus. In their seminal paper, P. Buser and P. Sarnak characterized Jacobians among flat tori using the geometry of their underlying Riemann surfaces through the notion of systole (that is, the length of the shortest closed geodesic).

The purpose of this master's thesis is to investigate the connexion between these objects at the intersection of algebra, number theory and hyperbolic geometry.

This is a vast domain which can be tackled from different directions.

References.

Buser, P.; Sarnak, P.: *On the period matrix of a Riemann surface of large genus*, Inventiones Math., 117 (1994) no. 1, 27-56.

Gromov, M.: *Systoles and intersystolic inequalities*, Sémin. Congr., 1 (1996) 291–362.