

GIOVANNI FORNI AND CARLOS MATHEUS  
INTRODUCTION TO TEICHMÜLLER THEORY AND ITS  
APPLICATIONS TO DYNAMICS OF INTERVAL EXCHANGE  
TRANSFORMATIONS, FLOWS ON SURFACES AND BILLIARDS

Weeks 2-3: 4-16 July, 6 double lectures (each lecture is 45-50 minutes).

The course will start from basic definitions in Teichmueller theory, such as that of Teichmueller and moduli spaces, measured foliations, quadratic differentials. We plan to cover (most of) the following results:

- a) that the Teichmueller flow is ergodic, hence mixing, and non-uniformly hyperbolic.
- b) that translation flows on any translation surface are uniquely ergodic in the typical directions (with a polynomial bounds on ergodic averages);
- c) that the Kontsevich–Zorich exponents are non-zero (the second in particular) with applications to deviation of ergodic averages;
- d) that translation flows on the typical translation surface are weak mixing (I may not prove the result for IET's).
- e) that there exist examples of  $SL(2, \mathbb{R})$  invariant measures (Teichmueller disks) with maximally degenerate Kontsevich–Zorich spectrum.
- f) that there exist examples of  $SL(2, \mathbb{R})$  invariant measures (Teichmueller disks) with complementary series (in the sense of the theory of unitary representations of  $SL(2, \mathbb{R})$ ).